MOTOR AGE

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Van Sicklen +

HUPMOBILE

United America Tour

—Words cannot express our appreciation of the faithfulness shown by the *Van Sicklen Speedmeter* in guiding us over all highways, mountain passes filled with snow, desert trails and rain-swept country***"

Hupmobile

Hupp Motor Car Corporation
Detroit Michigan U.S.A.

May 10 1917

The Van Sicklen Company.
Elgin, Illinois

Attention Mr. E. H. Van Sicklen, Jr

Gentlemen—

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A standard, five passenger Hupmobile car equipped with a Van Sicklen Speedmeter, left Washington, D.C., August 28th, 1916, touring to the capital of every state in the United States of America, and returned to the National Capital January 9th, 1917.

Words cannot express our appreciation of the faithfulness shown by the Van Sicklen Speedmeter in guiding us over all roads, good, bad and indifferent, as typified by wonderful mountain highways, mountain passes filled with snow, desert trails, and rain swept country; the greatest extremes of weather—the hottest of summer days to thirty degrees below zero, and at all times dependent on Van Sicklen accuracy to keep us supplied with fuel, water and provisions. Our mileage tallied in every instance with that recorded in our "Blue Book".

We attained our goal, covering 20,019 miles without a mishap, and are glad to be able in this small way to praise "VAN" which we counted as one of the crew, rather than a remarkable piece of mechanism.

Very truly yours,

Captain Hupmobile United America Tour

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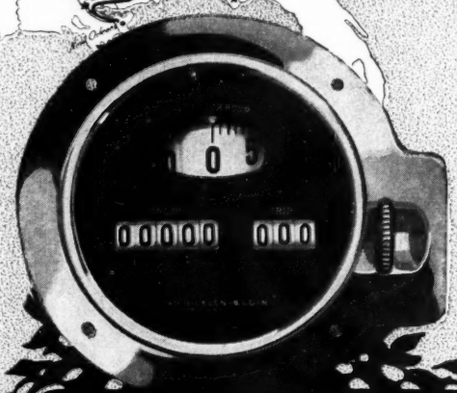

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MOTOR AGE

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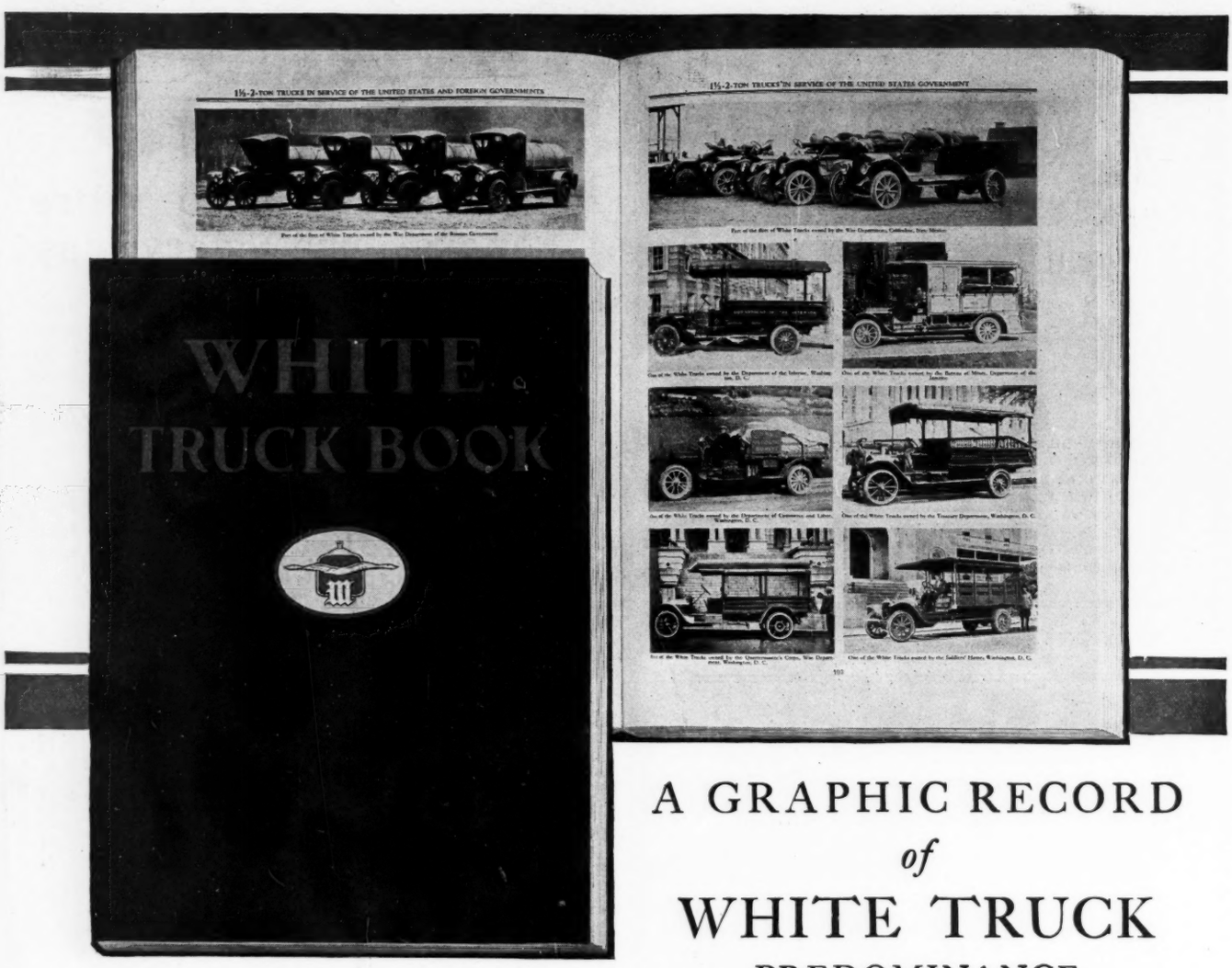
Contents

NEXT WEEK

Omaha is to dismantle its speedway after the July 4 races. Next week Motor Age will feature the valedictory speed events of the $125,000 board track.

COMING

How Motors Saved Verdun, which is to be the feature article of Motor Age issue of July 19, is an intimate account of the great work of the motor equipment in stopping the advance of the Germans. The author, W. F. Bradley, Motor Age's special war correspondent at the front, tells the story from personal observation—July 19.



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MOTOR AGE

Mount Fujiyama—It is rarely clear enough to get a snapshot of Fuji. One woman said she had passed it twenty-six times before she saw it

Japanese Touring Undeveloped

BY H. SIBLEY

JAPAN, to-day, is not a touring country. Enterprising motorists may make short runs, 20, possibly 30 miles, outside the cities to points of interest, but general cross-country touring is almost unknown. There are a few adventurous spirits who will set out from Tokyo for Kyoto, Osaka and Kobe, the last a distance of 350 miles, but they are so rare as to be negligible. The experiment of sending a number of military cars over this route was most discouraging. The cars were on the road five days, during which considerable engineering work on roads and bridges had to be done.

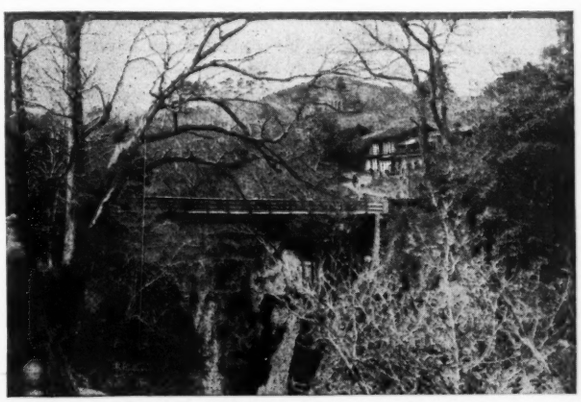
Ask the Japanese why there is so little country touring and they will tell you that the roads will not permit; ask the foreign residents who own cars—as nearly all of them do—and they will say that there are not suitable roads because of Japanese indifference to touring. And both of them, in a measure, are right. If a man is willing to put up with occasional rough going and will take the chances that one must take over unfamiliar roads in any country, then he may tour and derive much pleasure thereby, but in easy-going Japan there are not many who relish this sort of thing. They like their comfort and don't care to sacrifice it for the possible inconveniences of an expedition into the interior.

EDITOR'S NOTE—This is the first of a series of stories written by Mr. Sibley on Japan as special representative of Motor Age. He traveled extensively in the Japanese Empire last spring and the stories that have come from his pen on conditions in Nippon are told convincingly, giving special appeal by the human element.

While the motor car has been in Japan since 1903, there are as yet relatively few in that country, 1656 from the latest police registration, to be exact. The Japanese use their limousines exclusively for the city, and lacking that instinct for outdoor recreation which is so prominent a feature of American make-up, one rarely hears of their making a tour into the interior for the sport of it, and through this indifference little or nothing has been done on the roads to encourage touring.

To be sure, the Nippon Automobile Club of Tokyo made valiant efforts to stimulate interest in the motor car as a means of recreation; sign boards were erected on the roads to Kaumakura and Miyanoshita, two or three club runs were promoted and much active agitation in favor of road legislation was put forth, but while the enthusiasm was high among a few individuals, the general interest lagged and not a great deal was accomplished. Therefore, Japan is to-day much the same as it was when the first motor car appeared fourteen years ago, in respect to touring conditions.

It is thought, however, that a great improvement is imminent, for when the Japanese military attaches return from Europe, where they have observed the wonderful work of the motor car in every branch of service, they will be able



A view of the Monkey Bridge. According to tradition, when the aborigines first came to Japan they did not know how to build bridges, so the native monkeys showed them how by building this one, which has ever since been a pattern for all other bridges in Japan

1 One never knows what a Japanese horse may do on meeting a car; it may be docile or it may behave like a mature cyclone

2—A smooth village street, and characteristic of many towns in the interior

3—On the shores of a lake. This road never before traversed by a motor car

4—A sample of the infrequent bad road which may crop up anywhere

5—A rural highway that is fairly good

Type of car used in districts not reached by railroad, for public conveyance

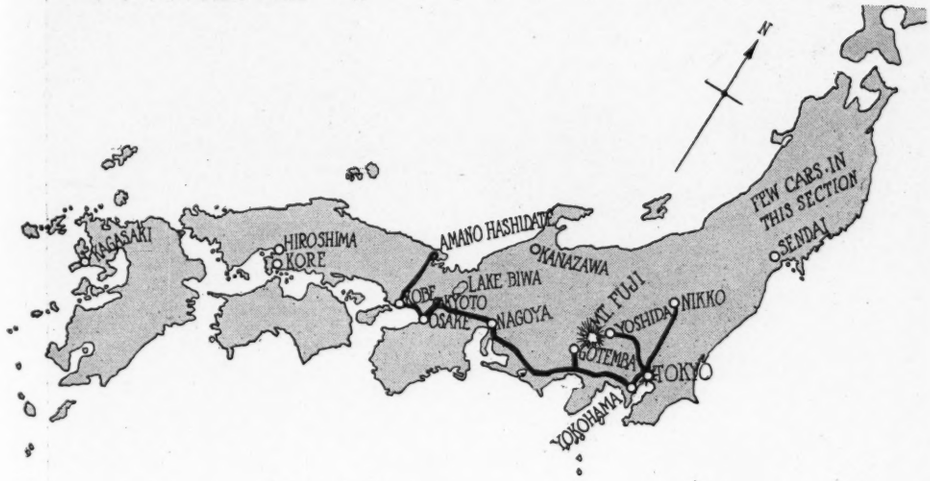
to convince the authorities and the people in general that good roads are a most important and indispensable feature of a progressive nation. When that is accomplished, Japan is going to be the most delightful touring field in the world. Every square mile of that interesting country is picturesque beyond description; there is no monotony in the scenery, there are mountains, lakes, rivers, plains all within a few hours' run, and everywhere are the quaint little villages replete with local color that one finds nowhere else on the globe.

Now, it must be remembered that touring is not impossible, in fact, if one has an active circulation and does not mind a few inconveniences which he may, and may not, encounter, he has a novel treat in store for him. The surface of the roads generally is excellent, as shown in the photographs taken at random in various parts of the country. In some of the mountain passes the grades are very moderate—a third speed grade for most cars, and nowhere are they impassable. The greatest difficulty, and particularly for cars of long wheelbase, are the narrow roads in untraveled sections, with their abrupt turns. Then some of the bridges, aside from being of very limited width, are a bit shaky for a heavy car. Often there are no bridges and one must cross a stream on a ferry, which is poled by coolies. The ferry may be large enough to handle a big car without accident and then again it may be a small one designed for the two-wheeled carts of the country, in which case it may navigate the stream right side up and it may not. An acquaintance of the writer had his car slide off in midstream, and though the water was not deep, it was half a day's work for horses and coolies before it could be salvaged and the experience didn't improve the carburetion any.

The heavy rains of the summer months very effectually discourage touring, for many bridges are washed away and some of the soft roads become impassable. Even in the spring one might venture forth on a hundred-mile tour and arrive at his destination without incident, but before he returned there might be a sudden and heavy rain of the season which would carry away a bridge and promptly put an end to his travels until that bridge was replaced, or a ferry brought to his assistance.

In the spring and fall, however, which are the two best seasons in Japan, the ambitious motorist does not often experience these adventures. They are an exception rather than the rule and are merely cited to illustrate what one might encounter. In several weeks touring in Japan the writer experienced nothing more trying than a risky passage over one shaky bridge, a few miles of rough going over roads that had never before been traversed by a motor car and which were off the main route between cities, and a bit of precarious driving along a road barely wide enough for the wheels and which was built on the top of a high dike between rice paddies. Making a right-angled turn on this last required the most skillful maneuvering to avoid a roll down the embankment into

A type of bridge in interior. These are usually washed away by torrential rains of summer



Map showing main touring roads in Japan

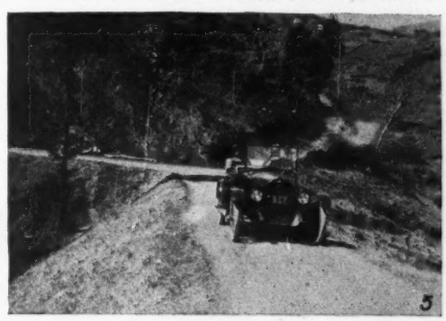
the receptive mud flat below. As for the mountain roads, they were sufficiently wide at most points to pass a cart and all the turns could be safely made by a car of moderate wheelbase.

All the best roads in the country are gravel, as are most of the city streets, with an occasional strip of macadam. In the country there is not enough heavy traffic to require frequent road repairs, and as yet there are not enough of the swift motor cars to draw the lighter particles from the roadway. Such repairing as is done consists of simply spreading loose gravel over the roadbed.

On most of the main highways between cities, the tourist may drive his car at any speed that pleases him, and in great comfort. In the villages, however, he must slow down almost to a walk, for here will be much to annoy him. The streets are narrow and used as a sidewalk by the inhabitants and they are pretty much congested at all times. Moreover, their limited width does not allow for much dodging in emergencies. A warning signal has little effect, for the country people are not accustomed to anything that moves as fast as a motor car and will step out of your way only when you are upon them. One may honk until he is figuratively blue in the face, without result. The sandaled stragglers do not seem to resent it, neither do they heed it. The Japanese children in particular are trying, for they toddle aimlessly all over the highway, usually with a sleeping baby strapped on their backs, and if one of them becomes startled—as he usually does—he is pretty sure to stumble in the awkward high clogs that he wears, and nothing but a reliable brake and a clear-headed driver will save him.

It is interesting to note that the Japanese drivers understand the psychology of their people better than foreigners, at least one English motorist asserted that he could make better time behind a native chauffeur, for the latter seemed to know by instinct just which way the Japanese pedestrian was going to dodge, a problem in mathematics that no foreigner has been able to solve. Nearly every American who has motored in Japan, however, speaks of the Japanese chauffeur in awed tones. And he is indeed an uncanny pilot. He is reminded of kid brother turned loose on the Lincoln highway with a 90-hp. growler, for there is no limit to the chances he will take. Even in the congested and narrow byways of Tokyo the writer has been hurtled along at 30 m.p.h. by one of these wild creatures, and death and destruction seemed imminent at every crossing. This manner of driving appears to be the rule, though foreigners do not attempt it. A certain American friend rented a car for a day in Kobe, but after the first half hour he climbed out and couldn't be induced to get in again, and that particular American was endowed with more than the average amount of courage; he had been experiencing thrills all his life down on the Mexican border. In Tokyo an American woman of unusually even temperament engaged a car and Japanese driver for a month, but was on the verge of nervous collapse by the end of the first week, partly from the reckless driving and partly from the incessant sounding of

A Shinto shrine on country road. Here the natives worship departed ancestors and often leave dishes of food for the good spirits. Evil spirits are driven away by strip of paper torn in fantastic shapes



1—A passable road in dry weather, but a quagmire in the wet season

2—Passing teams in the narrow streets is one of the most annoying features of touring in the interior

3—A Shinto shrine on knoll at Lake Kawafiuchi

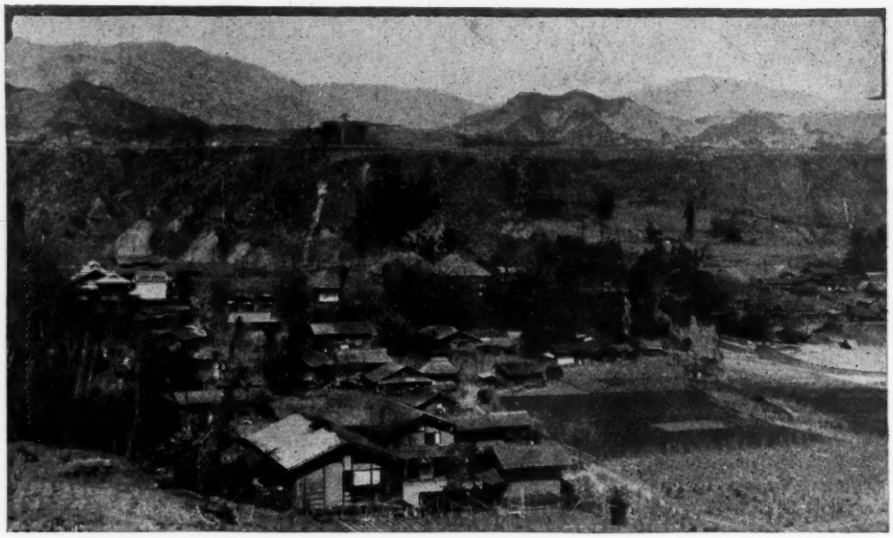
4—A freshly graveled road. Our car was first to travel this road in 5 yr.

5—A shelving road in the mountains, a fair sample of interior roads

a particularly raucous warning signal, which made all conversation out of the question. A number of fatalities have been reported on the omnibus lines running between railway stations and resorts in the mountain districts, and it is true that the mad driving of many of the Japanese chauffeurs has no parallel, even in the European war zone.

The Japanese owner rarely drives his car, in fact, seldom knows how to drive it, and prefers to leave such menial work to his chauffeur. A few of the more sportily-inclined owners, however, have mastered the art and one instance in particular comes to mind. Japanese friends in Osaka invited the writer to make a tour of points of interest, and two cars were provided for our party. One of them, a smart little white runabout, was driven by its owner, and the other by the conventional chauffeur. I was invited to ride in the runabout, which was handled so much better than the other chauffeur-driven cars that we were moved to make much favorable comment on it. A tactless thing to do, for promptly my other Japanese motorist insisted that I sample his driving, too, and apparently he never had a wheel in his hands before. There was a hair-raising hour ahead; my friend grasped the wheel and steered dead ahead, leaving his chauffeur at his side to manipulate gear shift, brake and throttle. Our course lay along an extremely narrow and badly congested street. On one side was an evil smelling canal without any parapet, and on the other all manner of wares piled high in front of mercantile houses. Even for a skillful driver it would have been a difficult course to pursue, at a moderate pace, by my ambitious friend cut loose with all the speed the chauffeur would open up, and many a coolie cart was rammed from the rear, while in our wake was a trail of devastation. Not until he had been assured that his driving was every bit as neat as that of his friend would he give up the wheel to the chauffeur.

The most plausible routes for touring to-day, and which will doubtless be the most popular routes in Japan are outlined in the accompanying map. The principal run will be from Tokyo to Kobe, through Yokohama, Nagoya, Kyoto and Osaka. Then a shorter run can be made to Nikko, north of Tokyo, and at Mt. Fuji, west of the capital. From Kobe as a starting point one may visit a number of places of interest, notably Amano Hasidate, a summer resort directly across the mainland. The greater part of the touring will be restricted to these limits, for north of Nikko are few places of interest to the tourist and he will be penetrating virgin country for the motor car. Likewise west of Kobe, there will not be a great deal of motor travel, for the bulk of the motor cars are registered in the waist of Japan, so to speak, between this seaport and Tokyo.



A picturesque village, typical of the interior

As for points of interest to the motorist, they are many and varied. Perhaps he will first visit Mt. Fuji, the highest mountain in Japan—12,300 ft.—which is about 90 miles from Tokyo, and can be approached from Yoshida on the north and Gotemba on the south, both of which places offer first rate accommodations to tourists. Next will come Nikko, a mountain resort famous for its temples and shrines. There is a Japanese proverb: "One cannot say beautiful until he has seen Nikko." It is about 140 miles north of Tokyo.

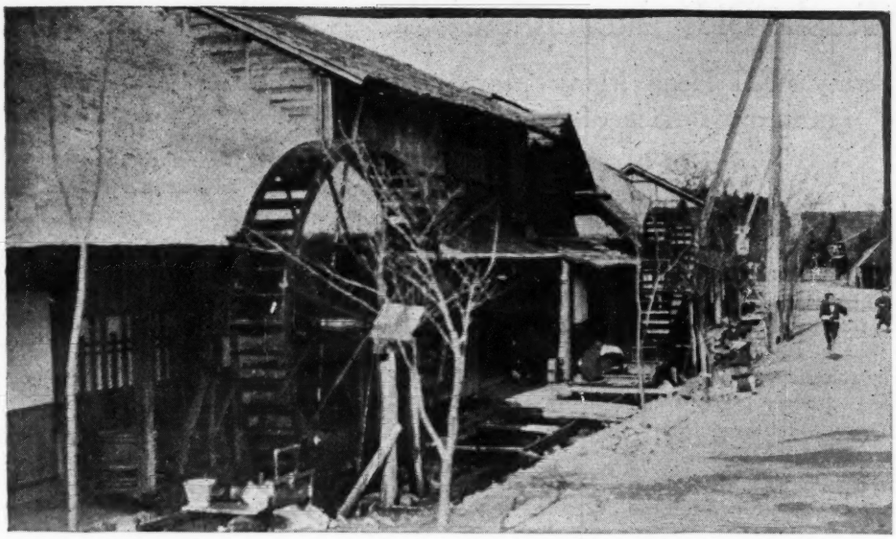
Kobe is 350 miles west of Tokyo, and on this route is Kyoto, the ancient capital of the empire, and from which one can make a side trip to famous Lake Biwa. The other cities and environs have individual attractions entirely too numerous to catalog here. Suffice it to say that no other country offers such a refreshing variey of scenery and customs in so small a space as does Japan. In every mile of touring there is something new to delight the eye and one never tires of it.

In traveling in the interior the motorist, unless he stops at the principal cities, will be obliged to put up in Japanese hotels for they are the only accommodations available in the smaller towns. He will find the average Japanese hotel the most immaculate institution he ever stepped into; a day or two in one will probably be the most novel experience he ever had for they are totally unlike European hotels.

The first thing the traveler does is to remove his shoes at the doorstep, for it would be, and is so considered, a sacrilege to tramp upon spotless grass mats, or "tetami" with muddy shoes. A fresh pair of straw sandals is provided, or the guest may go about in his stocking feet if he desires. The European always does the latter for the Japanese sandals or "zori" can be kept on only by a cord between the toes, and European hosiery is not designed to receive it.

A smiling and demure little maid, or "ney-san," about 4 ft. high and as dainty as a rosebud, in her flowered kimono, will conduct the traveler up a polished, narrow stairway to his room on the second floor, where he will eat as well as sleep. The foreign tourist will have a difficult time in making himself understood in the interior districts unless he is so fortunate as to have a Japanese friend who under-

A stop for gasoline as good as a circus in town



Water wheels driving rice mills. Twenty-seven of these, propelled by mountain stream runnning down village street, were counted in one town. The wheels operate a series of hammers which pound rice into flour

stands English, or has an interpreter, for outside of the large cities English is almost unknown, and the Japanese language cannot be mastered, under two or three years. Even the simplest terms and constructions are hard to remember, and the foreigner is pretty much at sea, conversationally, without an interpreter.

It will take some time for the traveler to become accustomed, or acclimated, as it were, to Japanese food and he will find none other in the country. Principally the native diet consists of fish, rice and a few vegetables, or occasionally a chicken, but the westerner does not find it sufficiently nourishing and usually leaves the table unsatisfied. They do not have bread, butter nor coffee and the experienced motorist takes these with him.

A meal in pure Japanese style is a novel experience to the foreigner. The guests are seated on the floor around a low, lacquered table called a "dai," and the serving maid, upon entering the room, always drops upon her knees at the doorway and bows profoundly. Green tea is served first, clear and without sugar, in tiny cups, followed by raw fish as a relish. The westerner usually shudders at the mention of raw fish, but it really is not unappetizing, sliced in thin, clean slices and dipped into a liquor something like our Worcestershire sauce. And if we shudder at raw fish, the Japanese is revolted at the thought of eating certain obstreperous brands of European cheese, and with some justification, which proves that it is all in the viewpoint.

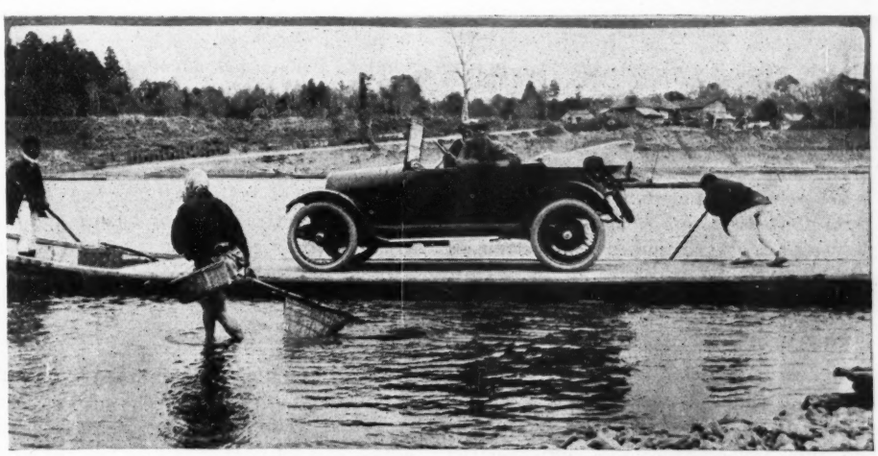
The meal proper will include a clear soup, perhaps with a bit of chicken in it, or an egg, and one or two kinds of broiled fish like our mountain trout and extremely palatable, and then rice. The stamina of the meal is this boiled rice, or "meshi," snowy white and without any seasoning. Sometimes the Japanese will pour tea over it, or add a bit of fish or chicken, but the pure rice needs no such embellishments to appeal to the diner, for it is indeed a dish the like of which cannot be had in this country.

Of course, the food is all negotiated with chopsticks, which are held in one hand and manipulated very deftly by the Japanese, literally as a pair of pincers would be used. There is no other table equipment furnished by the country hotels, and the tourist will bring his own knife, fork and spoon, or learn to use the chopsticks, or starve. The traveler should carry a supply of sweet chocolate with him, for he will find no sweets that he will relish in Japan country towns.

The Japanese bed is a simple affair, being merely three or four soft comforters folded lengthwise on the floor with another one for a covering. The pillow, however, as a pillow, makes a rattling fine chopping block, for it is nothing but a cylinder of some unyielding material which induces anything but sleep, and the guest will resort, perforce, to a folded coat or motor robe. Every hotel has its bath, but not many a private bath. On the contrary, the usual hotel bath in the remote sections—and some not so remote—is an embarrassingly public affair, and it is a very difficult matter to convey the idea to the proprietor that one yearns for seclusion in this little personal matter. Why be so fussy about such a thing ponders the inn-keeper, when for time immemorial it has been the custom in Japan for both sexes to indulge in their bath on the club system, and "au naturel"?

The hospitality of these likeable little people is charming, and the Japanese host and his menage will leave nothing undone in their power to make the guest comfortable. Their knowledge of what makes for Occidental comfort is a bit vague, at times, but the spirit is there and the guest is sure to be delighted. As for rates, they are exceedingly reasonable in the best of Japanese hotels in city or country, and half of what the European hotels charge for inferior, though more familiar, accommodations. And no gratuities are given directly to any of the servants; they all are included in the hotel bill, and are very modest.

There are a number of fair European hotels in the cities, principally owned and managed by Japanese who have had American training. Here one may get accommodations similar to those he is accustomed to at home, though as a rule a room with a private bath is at a premium and the equipment is not nearly as up-to-date as might be expected; in fact, with all due respect for the difficulties of conducting an Occidental hotel so far from the Occident, it must be admitted that some of the principal hotels are hopelessly obsolete in their fittings. The meals, however, generally maintain a high standard. In Kobe is a European hotel that is indeed a bright spot in Japan; it is the Oriental, and under full management of one Mr. Clarke, who was a trans-Pacific steamship purser for fifteen years. He explained that he had always had an ambition to conduct a hotel in Japan as it should be conducted,



A common means of crossing streams by ferry. Often, however, the ferries are barely wide enough for a motor car, and at least one instance is reported of a car sliding off ferry altogether in midstream

for on every homeward trip across the Pacific he heard the passengers discussing, not the scenery, nor the shrines, nor the customs, but the comforts and discomforts of the hotels, mostly the latter. And so he took charge of this hotel and brought it up to a plane that is a delight to the traveler and a godsend to the homesick wanderer in the Orient.

In touring through the country the motorist will have to put up with makeshift accommodations for his car. Even in such cities as Tokyo, Yokohama, and Osaka there are very few public garages—perhaps only two in Osaka, which has a population of over a million. And so he will do well to carry a tarpaulin, and also have a large spare fuel tank, for gasoline stations are few and far between and the quality of gasoline varies so much that one is never certain just what he is going to get in one of those 5 gal. sealed tins that are used all over Japan. Many motorists have safety devices fitted to their cars, not to avoid theft, but to keep the inquisitive Japanese youngster from tampering with the levers. A car is still a great novelty in the country and a crowd collects as soon as it stops, and if left without a guard for a moment the owner may be pretty sure that every button, lever and knob has been pushed, shifted and turned before he gets back to it.

Treatment Is Courteous

Beyond this annoyance, one receives the most courteous and kindly treatment from the Japanese. Some motorists have reported youngsters throwing stones at the "jidosha" as it speeds by, and occasionally one hears cries of "ijin," meaning foreigner, or literally barbarian, which is probably not intended to be complimentary, but generally the tourist encounters only the greatest politeness. The teamsters are very obliging about getting out of the way—often their horses are the first to recognize their obligation and get out of the way and out of sight before the driver sees the cause for so much speed.

Not only that, but something of interest greets him at every turn, and for that reason Japan will some day, in the near future, become the most attractive country in the world to motorists. The Philippines already have passed Japan as a motoring country, and the relatively undeveloped China boasts more cars, but an aggressive and alert nation like the Japanese is not going to be content to accept second place in the Orient in any field, and we may expect some remarkable development within the next few years.

DOCTOR'S DEGREE FOR COFFIN

Ann Arbor, Mich., June 29—Howard E. Coffin, attending the graduation exercises of the University of Michigan yesterday, addressed the assembly and discussed the war in its different phases. Mr. Coffin was given a Doctor of Engineering degree by the University.

Truck Bids Incomplete

Army Will Need Many More Transport Bodies of Various Kinds

May Divide Vehicles Into Convoys of One Chassis

WASHINGTON, D. C., July 29—The military transport bodies for trucks class A and B for which bids were opened by the government recently represent only one of many kinds which will be wanted. There will be required many more of the transport, or stake, bodies, than of any other sort, but there will be large quantities of other styles as well.

A truck convoy usually consists of about thirty vehicles. With this number will go a repair truck, equipped for roadside repair work and simple jobs, an officers' truck with a body which is part passenger-carrying and part office, and one or more kitchens, also a gasoline tank wagon.

It is the present plan of the War Department to divide its trucks into convoys consisting of only one chassis, so that the auxiliaries will be mounted on the same running gear as the transport bodies. The exact nature of the convoy depends, of course, upon the length of the haul. On short runs the repair shop and the kitchens would not travel. None the less the proportion of auxiliaries to transport trucks will probably be in the order of 3 per cent.

In addition there will be some special bodies for various odd purposes and, of course, ambulance bodies. The latter are not handled by the Quartermaster's Department, as are the others, but come under the direction of the Surgeon General's department. They will, however, be required for the standard chassis as well as for passenger car fitting in smaller sizes. Another body, which probably will be a "conversion" for the standard transport body, will be one for carrying troops.

Up to the present it is only the transport body that has been decided in all details. Captain Britton has added details and has cut the cost slightly. The final body has several novel features, of which the principal ones could be seen on the general assemblies. Firstly, there are no side rails of the conventional sort. The body is carried on a series of cross beams and the floor connecting them is not clamped rigidly in any other direction. This allows the body to weave to an unlimited extent without starting any joints, for there are no joints to injure.

To give another instance, the tail board attachments are quite novel, and the usual cross rod which forms the hinge is eliminated, the purpose being to get rid of a piece which is easily bent and rendered useless by a rear end bump. Then the clips which hold the tail board in the vertical position have a link which permits latitude sideways, meaning that if the body sides bulge under the load, the tail board can still be closed and fastened. There are no wood screws in the whole body, every junction being made by bolts; so that if a body gets loose through shrinkage or constant weaving, it is only a spanner job to tighten it up again.

The body is in practically final form in every detail, and blueprints are obtainable of practically all of it. Next will come the officers' car, which will be similarly completed in every detail in the department's office, and then the others will be cleared up in quick succession.

CONTRACTS FOR 20,000 TRUCKS

Washington, D. C., June 29.—Contracts for from 18,000 to 20,000 motor trucks soon will be formally awarded by the Quartermaster's Department under bids recently submitted to Colonel Kniskern at Chicago. Major Drake, in charge of purchases, stated that while awards of contracts had not yet been formally made, it is understood recommendations as to such purchases have been sent to the higher authorities for formal approval. It also was stated at the War Department that any differences which might have existed as to specifications have been cleared up and that the Government will purchase trucks, relying upon the makers to go as far as they possibly can in standardizing smaller parts.

TO REFINANCE CHALMERS

New York, June 2—A special meeting of the stockholders of the Chalmers Motor Corp. has been called for July 11 to vote on increasing the capital stock from $3,00,000, consisting of 600,000 shares without par value, to $14,200,000, consisting of 464,000 shares without par value, and 264,000 shares with a preference as to principal of $45 each, and as to dividends of $3.50 a share per annum. A plan for raising new capital being worked out in Wall street provides for change of control to New York bankers. Several new directors will be elected in place of those now serving. President Hugh Chalmers probably will become chairman of board of directors.

COKE FOR MOTOR TRUCKS

London, June 7—The most interesting matter in England to-day is the farm tractor situation in which 6000 to 7000 tractors of the Ford type are being built under the immediate auspices of the Ministry of Munitions. The work is being carried out under the direction of Mr. Sorenson of the Ford Motor Co., who is here with one or two engineers looking into the work. The work of manufacture is controlled by a department known as the Agricultural Machinery Branch of the Board of Trade, and the head man, or controller, is S. F.

Edge, founder of the Napier business, and at one time holder of the 24-hr. record.

Another new development in England is the use of coke as a motor truck fuel. An English concern, the National Steam Car Co., which has been manufacturing steam trucks and buses for years, and which always has used kerosene, has developed the coke type of steamer. This fuel has proved entirely satisfactory as one of these trucks with a 3-ton load on a test run of 200 miles consumed approximately 5 lbs. of coke per mile. This put the cost of fuel at 1.8 cents per mile.

SPEEDWAY TO EQUIP AMBULANCE

Chicago, June 30—As a result of receipts of the War Cause races held at the Chicago speedway June 16, the Speedway Park Association has decided to send a completely equipped ambulance to France, the order for which will be given immediately. The ambulance will be known as the Speedway Park Association Chicago Ambulance. In addition the association voted to send a check for $5,000 to the Chicago branch of the American Red Cross.

NEW STANDARD WOVEN FABRIC

Walpole, Mass., June 30—The Standard Woven Fabric Co. has announced a new brake lining material named Stanwal. This new material is impervious to oil, grease, gasoline, water or any foreign substance.

OFFICIALS FOR INTERCITY RUN

Chicago, June 30—Plans for the Intercity reliability run, which starts from Buffalo July 17, have progressed to the point where the chief officials have been named. Richard Kennerdell, chairman of the Contest Board, American Automobile Association, is to be a referee. John De Long of the Chicago Automobile Club is named as starter, and Dai Lewis of Buffalo will be pilot. Teams of five or more men from at least three cities are certain. The team from Chicago will make a combined land and water trip to the starting point, driving to Detroit and thence by boat to Buffalo.

MORE PRICE INCREASES

Chicago, July 2—Several price increases have been made known during the week, and warnings of other increases have been issued. For instance, the Paige-Detroit will raise prices July 15. Among those makers who announce advances are:

MAKE	MODEL	OLD PRICE	NEW PRICE
Federal	1-ton	$1,650	$1,800
Federal	1½-ton	2,100	2,200
Federal	2-ton	2,300	2,450
Federal	3½-ton	3,000	3,150
Mack	1-ton	2,250	2,400
Mack	1½-ton	2,700	2,800
Mack	2-ton	2,900	3,000
Mack	3½-ton	3,750	4,250
Mack	5½-ton	4,500	4,750
Mack	7½-ton	4,800	5,000
Selden	Light delivery	985	1,075
Selden	1-ton (internal gear)	1,385	1,550
Selden	2-ton (worm drive)	2,350	2,550
Selden	2-ton (internal gear)	2,150	2,350
Selden	3½-ton	3,150	2,400
Detroit	63	2,375	2,475
Detroit	66	2,475	2,575
Detroit	68	1,875	1,975

Not Easy to Be Aviator

More than Cross-Country Trip Necessary to Qualify for War Service

French Flyers Pass Many Tests for Pilots' License

SOMEWHERE in France, June 10—From reports reaching America with regard to the new aviation program it is certain many false impressions with regard to training of aviators and pilots will have to be corrected. In France no aviator receives his license until he has proved himself complete master of the machine and the air, and in America there is a harder course ahead of the aviator than is generally contemplated. The person who expects that ability to fly 30 miles across country will bring a pilot's license will have to change his mind.

Here in France aviators have to make two short cross-country trips called petite voyage, which are, however, only preliminary to the triangular trips in which you have to stop at different angles of the triangles and have your papers signed showing that you have made the complete circuit. Each of these triangular trips is approximately 40 miles and the trip must be made in an hour.

Following this triangular test there are similar tests over larger triangles, in which you fly from town to town, alighting at each town to have your paper signed. Such a triangular trip has to be made twice over different courses, and your machine is fitted with a baragraph which not only checks your course but also the height at which the trip was made. Each of these trips is approximately 200 miles and the minimum altitude permitted is slightly over 3000 ft.

The next step is an altitude test in which the pupil must fly at a minimum of 6000 ft. and remain there for an hour.

Having done this practical flying the pupil is brevetted a pilot, and if your record is good with a minimum of breakages you may be given the standing of a corporal.

Aviators to be of real value on the Western front must be masters of their machines in inclement weather as well as in fine weather.

Much improvement is being made in airplanes, and the new models coming out are generally good improvements on the existing types. One new scout machine with 130-hp. motor has 15 sq. m. of surface and is capable of climbing to a 10,000-ft. altitude in 9 min. flat

TO STANDARDIZE MOTORCYCLES

Washington, D. C., June 29—A joint meeting of officials and members of the Society of Automotive Engineers and of the Motorcycle and Allied Trades Association, was held at the S.A.E. headquarters in this city yesterday. A request had been made by the Ordnance Department that the S.A.E. organize a new division of its standards committee to standardize the parts of motorcycles for military use, in other words, to design the best possible motorcycle for war purposes. Motorcycle manufacturers present at the meeting enthusiastically took up the suggestion, and a division was at once formed under the chairmanship of M. W. Hanks, standards manager of the S.A.E., and comprising the following members:

T. W. Henderson, president of the Motorcycle & Allied Trades Association; T. F. Rogers, Rogers Mfg. Co., Chicago; William S. Harley, Harley-Davidson Motor Corp., Milwaukee; F. J. Weschler, Hendee Mfg. Co., Springfield, Mass.; C. O. Hedstrom, Hendee Mfg. Co., Springfield, Mass.; F. C. Butler, Jr., Hendee Mfg. Co., Springfield, Mass.; L. Ogden, Cygnet Rear Car Co., Buffalo, N. Y.; Frank W. Schwinn, Excelsior Motor Mfg. Co., Chicago.

It was decided at the meeting that all of the wheels of the motorcycle, sidecar and rearcar should be of the same diameter and, in fact, the same in construction throughout. Clincher tires, 28 by 3 in., are to be used on all wheels. The rims are to be drilled for forty ¼-in. spokes. Other items regarding which standard dimensions and forms were laid down include the spokes, nipples, spark plugs, headlamp lugs and supports, chains, throttle control, clutch pedal, brake pedal, gearshift, kick starters, oil and grease cups, cylinder displacement and carrying capacity.

WILLYS-OVERLAND SHIPMENTS

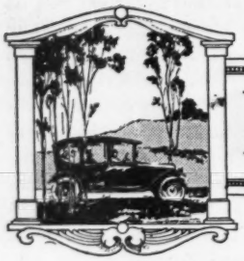
Toledo, Ohio, June 30—The Willys-Overland Co. reports May shipments of 16,025 against 15,937 in May, 1916. The total number of cars shipped this year to June 19 totaled 85,792 compared with 88,295 for the corresponding period a year ago.

HOW MOTOR TRUCKS SAVED VERDUN

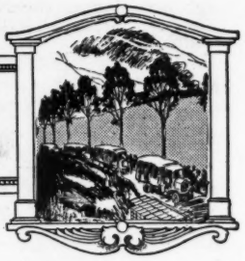
Military experts credit the motor truck with being the chief factor in stopping the advance of the Germans before Verdun. The story of how this was accomplished as told by Bradley, MOTOR AGE'S special War Correspondent at the front, reads like an H. G. Well's romance—except that it is true—see MOTOR AGE for July 19.

SLOAN TO CONTROL PERLMAN

New York, July 3—Special telegram—Alfred P. Sloan, president United Motors Corporation, has taken over the management of the Perlman Rim Corporation. Heretofore he had no connection with the affairs of the Perlman corporation, as same was under the direct charge of L. H. Perlman, who has now retired as president and director. Sloan has elected G. M. Day as his representative in the Perlman corporation. Day has accordingly been elected president.



EDITORIAL PERSPECTIVES



A War of Standards

ONE of the men highest in the councils of our allies is credited with the saying, "Modern war is a war of standards." It is by standardization of the highest sort that Germany has been able to turn out submarines in quantities and with a reliability that has made them the actual menace to the subsistence of her European foes that they have become. Similarly, it is by standardization of the highest sort that it has been possible for America and her allies to build rapidly and in quantities the submarine chasers, the fleets of small power boats that give promise of ultimately overcoming the undersea boats of the central powers.

THAT standardization has made possible the enormous output of munitions for the big guns is too well understood to need comment. This, likewise, has been responsible for the production of immense quantities of nearly everything else that enters into the prosecution of present-day warfare. It is this that has made possible the answer of the American truck manufacturers to the Government's call for military trucks. These standards are chiefly the work of the Society of Automotive Engineers. Now the society, through its standards committee, is accomplishing a work that is of even greater importance to America and its allies in the standardization, at Government request, of the military and naval aircraft construction.

THE Council of National Defense, in a recent statement says that the whole answer to the aircraft problem now is standardization. The American development of the airplane motor will be a standardized motor, such that various parts can be turned out in different plants and shipped to some other place to be assembled. As the work develops our engineers can be engaged constantly in further perfecting the motor and as the industry expands in quantity it also can improve the quality of its output.

A LARGE percentage of the first machines, of course, will be training planes, both because we need them and because it will take time to turn out the tools, dies and gages necessary to manufacture in quantity the battleplane models which nearly three years of war has developed. Four to six months, however, will find us building in quantity motors serviceable for battle machines. We have no intention at the beginning to attempt the manufacture of the very speediest highly specialized light fighters which the allies are now turning out. We can produce in vast quantities the training planes and the heavier and less speedy battle types, which are just as essential. This will leave the British and French free to turn more of their attention to the development of the fastest types.

Motor Draft Machinery

EVEN now while the wheels of the ponderous machinery of the selective draft are beginning to turn few of us realize what it means to put into the field an army of the size that we contemplate equipping. Few of us have more than the haziest of an idea as to just what a division means in men and equipment.

THE importance which will attach to the motorization along many lines of those essentials going into the makeup of the division of the army in the present war may best be illustrated by the reference to the great size of cantonments still to be occupied in this country. At each of the sixteen cantonments which the War Department says must be constructed before Sept. 1, there will be a full division of infantry, which, with additional troops, such as heavy artillery, aero squadrons and ballon companies, will swell the number at each camp to about 40,000. This does not take into consideration the national guard and regular army at war strength, organizations which will be swelled to a force of 750,000 men.

THIS is what a division of infantry means in a mobile equipment to each of the sixteen cantonments: 6846 horses, 4875 mules, 1009 wagons, of which 360 are to carry the rations, fifty 3-in. guns, twenty-five 3-in. howitzers, ninety-two machine guns, 32,000 rifles, twelve motor cars, sixty-seven motor trucks, sixty-four motor cycles, twelve airplanes, forty-eight ambulances, and 328 other carriages.

IF the division is motorized the military column will be a mile in length, and there will be a material reduction in the number of horses and mules. The equipment of a division when motor transportation is substituted for horse and mule-drawn wagons is 2587 mules, 6713 horses, thirty-four motor cars, 627 motor trucks and 106 motorcycles. The ordinary airplane and ambulance equipment remains the same. With the expansion of the army's aerial equipment to a plane hitherto undreamed of, it is planned to have one or two aero squadrons at each cantonment. This is in addition to the squadron to be trained at the army flying schools.

Getting Out of Town

TOURISTS who are following any of the marked highways on extensive trips find more difficulty and lose more time in getting into and out of a strange city on their route than they do in following many miles of the marked road in the country. This is due to the fact that in most of the larger cities the city authorities and park boards have prevented the marking of the routes on the city streets and boulevards on the plea that such markings are a disfigurement. It would seem that some unobtrusive method of designating the proper streets to take to the proper outlets from the city from its downtown district could be devised and so followed that it would not militate greatly against the esthetic aspirations of the municipal authorities, which now prohibit them.

IT seems that the chief stumbling blocks in marking the highways through the city streets are ordinances which prohibit advertising signs on city property, such as street sign posts, lamp posts, etc. Is it not possible for local motoring associations to have ordinances amended or interpreted so that it will permit at least placing some designating mark of the highway on the city's sign posts at street intersections?

The first American flag to fly over the French lines—Edward F. Hinkle, of the LaFayette Escardrille standing in front of his airplane which was the first to carry Old Glory over the European battle lines. This photograph was made in April of this year near St. Quentin and is the forerunner of the American battle flags which now shortly will follow. Below the Stars and Stripes is the emblem of the Escadrille which bears the Indian head in red, white, blue and yellow. This was designed by Corporal Hinkle. This daring American aviator recently was lost overnight behind the German line, but returned safely to the Allied lines the next morning

Government Needs Aviators by Thousands; Is Not Being "Swamped" with Applications

THE War Department authorizes the following: Shortly after our declaration of war with Germany a well-intentioned and patriotic story went the rounds and, unfortunately, did the work of many another well-intentioned and patriotic story. Among the sort of spirited and adventurous young men upon whom the Government is now calling for aviation service the rumor spread rapidly and the word was passed from university clubs to college campuses, from motor car and truck factories to garages: "Already over 6,000 men have applied for aviation examinations. The Government is being swamped."

As a result of this popular bit of misinformation a potential army of young men—ideal flyers by physique and temperament—side-tracked their ambition and made a try at other fields. Instead of the aero camps becoming "swamped," as rumor had it, much less needful branches of patriotic effort were badly overdone by young men with a desire to get in and do something for their country. Men between the desirable ages of 19 and 25 began volunteering in droves for the "mosquito fleet," under the idea that if they couldn't get the Germans from the air they could get a shot at a submarine lying in wait off Sandy Hook or outside Boston Harbor. And, as a result, the country is still calling for flying recruits.

The matter of our six flying camps—which will grow to a total of 24 before the end of next year—is another story. The Government wants aviators and yet more aviators. It wants them by thousands, and it does not intend to turn away any good material. If there is any confusion in the public mind as to places to which to apply, it is a simple matter to state the places where applications are taken. They are as follows:

The Signal Corps, War Department, Washington, D. C.
The Mineola Field, Mineola, L. I.
The Essington Flying Field, Essington, Pa.
Fort Sam Houston, San Antonio, Tex.
North Brothers Island, San Diego, Cal.
Signal Officer, Central Department, Chicago, Ill.
Fort Omaha, Omaha, Neb.

1916 Registration Gains 1,067,332

Total Number of Motor Cars in United States Reaches 3,512,996

WASHINGTON, D. C., June 30—In 1916 1,067,332 more motor cars were registered in the United States than in 1915. This was an increase of 43 per cent. The gross total of registered cars, including commercial cars, was 3,512,996; the number of motorcycles registered was 250,820. The several states collected in registration and license fees, including those of chauffeurs and operators, a total gross revenue of $25,865,369.75. Of this amount 92 per cent, or $23,910,811, was applied directly to construction, improvement, or maintenance of the public roads in forty-three states, according to figures compiled by the Office of Public Roads of the United States Department of Agriculture.

The figures for 1916 correspond very closely with the annual percentage increase of motor car registration of the last three years. This yearly increase has averaged 40 per cent in the number of cars and 50 per cent in revenues.

When viewed over a period of years, the increase in motor car registration and gross revenue has been remarkable. In 1906 the total state registrations were approximately 48,000 cars, on account of which the several states collected in fees and licenses a total gross revenue of about $190,000. Only a small part of this was applied to road work. In 1916 the $25,865,369.75 collected formed nearly 9 per cent of the total rural road and bridge revenues of the states.

Recent years have shown an increasing tendency to put the spending of the motor car revenues directly in the hands of the state highway departments. Of the total amount applied to road work in 1916, 70 per cent, or $16,411,520, was expended more or less directly under the control or supervision of state highway departments. Only thirteen states did not exercise any direct control over the expending of the net revenues.

FINAL PAYMENT TO CREDITORS

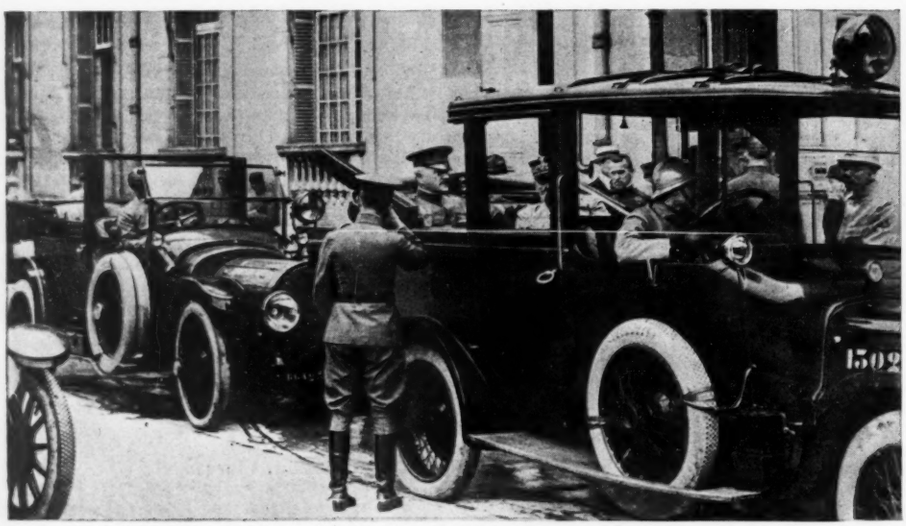
Detroit, June 30—The Detroit Trust Co. is issuing checks covering the final distribution of assets to the creditors of the Lozier Motor Co. and to creditors of the Flanders Mfg. Co. Payments from the estate of the Lozier Motor Co. amount to 6.941 per cent, making a total of 29.441 per cent which the creditors realize. Checks to the creditors of the Flanders Mfg. Co. make payments of 95 per cent. Previous payments to creditors totaled 50 per cent.

JORDAN GIVES JULY OPTIONS

Cleveland, Ohio, June 30—The Jordan Motor Car Co. is announcing six striking color combinations for July only: Liberty blue, optional on touring car, sport model or sport roadster; Pershing gray, for four or seven-passenger cars; Italian tan, sport model only; Jordan maroon, sport model and seven-passenger; Mercedes red, sport roadster exclusively; Venetian green, optional on all three Jordan models. No advance in price will be made for these special color jobs delivered in the same rotation as orders are received.

KARDELL TO MAKE TRACTOR

St. Louis, Mo., July 2—The Kardall Tractor & Truck Co. recently incorporated in Delaware with $1,000,000 capital stock, has opened offices here for the manufacture of the Kardell four-in-one tractor. The tractor, which is the invention of H. W. Kardell, is so named because it can be changed into plow, tractor, truck and farm power engine without difficulty. Mr. Kardell completed his first model about eighteen months ago and since then has been conducting a series of experiments with tractors manufactured by the St. Louis Car Co. The officers of the new company are H. W. Kardell, president; J. C. Kardell, vice-president; H. F. Fahrenkrog, treasurer; W. F. Fahey, secretary. These men also are officers of the Kardell Motor Car Co., distributor of the Reo cars in this territory. St. Louis capital is promoting the new company. Orders have been placed for 2,000 motors.



This picture was one of the first to reach this country after General Pershing and the American troops reached France. It was taken in front of American headquarters in Paris

OPEN BIG DIAMOND-T PLANT

Chicago, June 30—Formal opening of what is said to be the largest floorspace factory devoted exclusively to the building of motor trucks was celebrated last night by a beefsteak dinner served in the new assembly room of the Diamond-T Motor Company. C. A. Tilt, president of the company, was host to 125 guests.

The new plant covers 110,000 sq. ft. and is arranged for progressive assembly. Production scheduled for the present calls for ten trucks a day, but there are factory facilities for turning out twenty-five to thirty a day.

PRICE MAKES ELECTRICAL SYSTEM

Chicago, June 29—Charles W. Price, whose business as Overland distributor in this territory was purchased by the Willys-Overland Co. last winter, is now president of the Electromatic System Co., which makes a light, power, heat and battery charging outfit. A. S. Johnson, formerly general manager of Price's company, is the vice-president and secretary, and C. H. Chamberlain is treasurer.

The system is automatic. The plant starts whenever a demand for current is made and continues to deliver current until the last demand ceases. It runs when being used and stops when not in use. During operation the governor maintains constant speed of the engine, so that the voltage remains the same regardless of load. A safety feature is the use of a Stewart storage vacuum tank, which makes it possible to carry the fuel outside to an underground tank.

THOUSANDS AT MILWAUKEE SALON

Milwaukee, Wis., July 2—Thousands visited the salesrooms of the forty-three members of the Milwaukee Automobile Dealers, Inc., Thursday, Friday and Saturday, the occasion of the first annual Summer Salon conducted by the association to stimulate retail business at the beginning of the summer season in Milwaukee and vicinity.

Although the summer show started out with a heavy rainstorm on Thursday morning, the first day found a total of 4576 visitors calling at the various salesrooms, each of which was uniformly decorated with cut flowers, potted plants and the national colors. At each salesroom a special display of the latest models was shown, and in many instances the factories furnished cut-out chassis.

The object of the show, besides stimulating retail buying, was to test business conditions in the trade. The sales record indicates that in Milwaukee, at least, business is excellent.

RUN PLANNED TO MEETING

Colorado Springs, Col., June 30—A collective sociability run, the first of its kind, will be run from Indianapolis, starting July 2, over the Pike's Peak Ocean-to-Ocean highway to Colorado Springs for delegates to the annual midsummer meeting of the association July 10-11. About twenty cars have been signed for the tour already, and at least that many more are expected when the run begins.

The tour is intended for the grand opening of the "Appian Way of America" as the highway is called sometimes. Those planning trips to that region are asked to join this tour party. The schedule allows plenty of time. There will be no racing, and every detail as to comfort and sightseeing will be given attention.

The itinerary is: July 2, Indianapolis; July 3, Springfield; July 4, Macon, Mo.; July 5, St. Joseph; July 6, Belleville, Kan.; July 7, Norton, Kan.; July 8, Burlington, Col., and Colorado Springs at 4 p. m. The time will allow delegates and visitors to visit in the Pike's Peak region, as the road meeting sessions open July 10. Good hotels are at each night control.

BRITISH CARS DECREASE 200,000

London, June 27—The total number of motor vehicles in Great Britain has decreased over 200,000 since the beginning of the war. Motor cars have decreased nearly 50 per cent. The total number of motor vehicles in 1914 was 536,747, divided into 281,175 cars, 233,381 motorcycles and 22,191 trucks. According to the latest census, the total is 331,897, including 150,249 cars, 160,290 motorcycles and 21,358 trucks.

EXPORTERS' CLUB MEETS

New York, June 30—Much foreign trade may be lost to American manufacturers by advancing prices unduly to buyers abroad, according to warnings given at a smoker held by the Export Managers' Club of New York last night. It also was brought out that there is a fear that makers in France, Germany and Switzerland, after manufacturing American methods of advertising, would be able to undersell the American maker in foreign markets.

Illinois Law Regulates Headlight Glare

Requires Dimmed or Extinguished Lamps 200 Yds. from Approaching Vehicle

CHICAGO, June 29—A state headlight law goes into effect in Illinois July 1. It was signed by the governor only this week and seems to have slipped through without the knowledge of the motoring organizations of the state. It undoubtedly will meet with the approval of motorists as a whole. The chief provision of the ordinance is that no glaring headlights may be used under any circumstances within 200 yds. of an approaching vehicle. They must be dimmed or extinguished entirely. However, if the lights are extinguished entirely, that would seem to be an infraction of the present state law, which provides that all cars must carry lights between sunrise and sunset.

There has been no chance as yet to study the new law, but it seems it would provide automatically a dimmer regulation for virtually all cities of Illinois which have had none in the past, for there are few urban streets where one is not within 200 yds. of a vehicle of some sort most of the time. It provides also that front and rear lights must show on standing motor cars throughout the state at all times after sundown.

Another provision specifies a fine of $10 to $25 for any person under sixteen years of age who drives a car and a similar fine for any one who permits a child to do so.

FORD BUILDING TIRE PLANT

Detroit, June 29—Included in the various buildings being erected on the River Rouge for Henry Ford will be a very large unit devoted to tire manufacture. Tires made in this factory will be manufactured exclusively for Ford cars.

STEWART-WARNER PROFIT

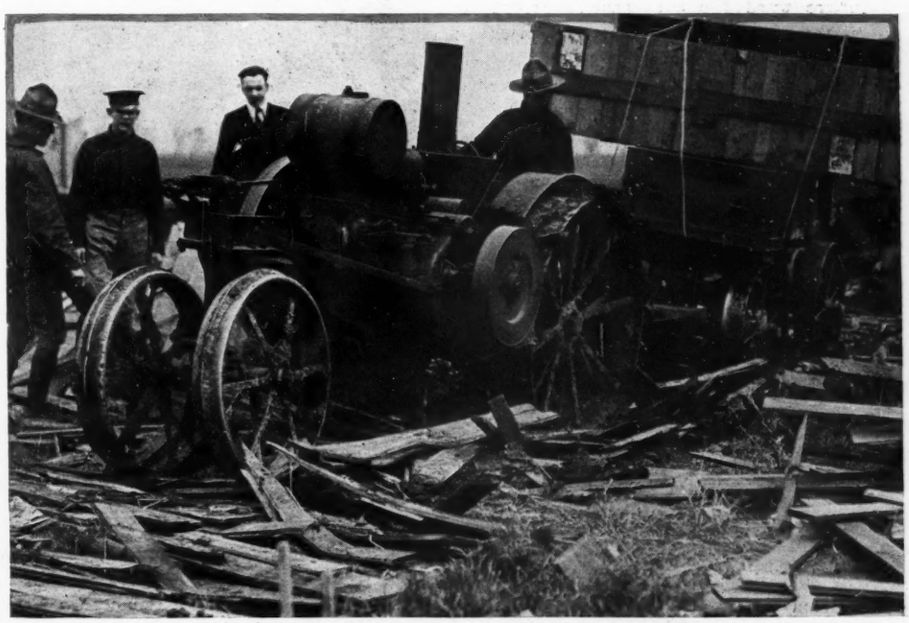
Chicago, June 30.—Stewart-Warner Speedometer Corp. business is $350,000 ahead of that at this time last year. It is stated also that the company's business would have been $750,000 greater had labor trouble not occurred. The company has unfilled orders on its books amounting to $1,000,000 and has a night force at work.

PETARD DIRECTS PARIS FOUNDRY

Racine, Wis., July 2—Captain Rene Petard, formerly chief engineer of the Mitchell-Lewis Motor Co. and who was seriously wounded in the battle of the Marne, has been in charge of a large foundry under government control near Paris since his recovery, according to a letter just received by Captain William Mitchell Lewis. Captain Petard was called to France to join his regiment of engineers in 1914. George Boyer, who came to America with Captain Petard at the time Mr. Lewis brought him over as chief engineer for the Mitchell factory, also is in the French army, with the aviation corps.

SHORTAGE CAUSES SHUT DOWN

Detroit, July 2—The Hupp Motor Car Corp. closed its plant from last Saturday until next Thursday owing to a shortage of materials. The Hupp executive offices are also closed during this same period.



This government tractor is in use at the Army aviation camp at Ashburn, Ill., just outside Chicago, hauling airplanes. Just how long the camp will remain, owing to difficulties in obtaining land, is uncertain

Motor Industry's Part in War

Speeding Up of Production to Meet National Crisis Feature of Momentous Meeting of Men of Automotive Fields at Washington

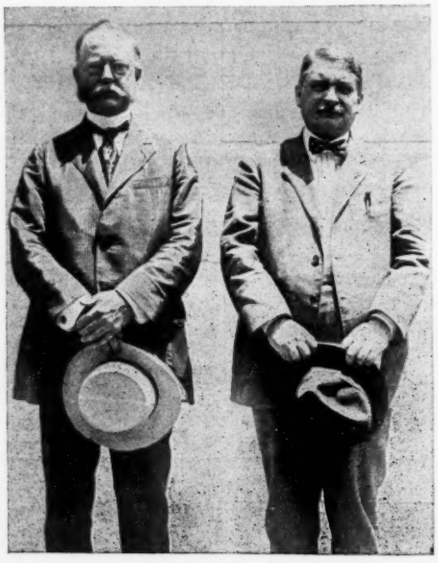
Overflow meeting of engineers on the lawn of Bureau of Standards. Lieutenant de la Grange of the French Commission repeats his talk on battleplanes to those who could not get into the meeting

By Darwin S. Hatch

WASHINGTON, June 29—The war atmosphere and the great importance of the motor car and allied industries in the carrying forward of America's part in the world war were the chief features of the two-day session of the designers and builders of motor cars, motor boats, airplanes and tractors in Washington Monday and Tuesday. The fact that the part that these industries are to play in the future toward the successful prosecution of the war was made most emphatically prominent.

This was the annual midsummer meeting of the Society of Automotive Engineers, the first day's work of which was reported in MOTOR AGE of last week. This consisted of the general meeting of the Standards committee of the society at the Bureau of Standards. The various divisions of the committee reported to the committee as a whole their recommendations for new standard shapes and sizes of parts for airplanes, tractors, trucks and passenger cars, which recommendations upon acceptance by the standards committee were referred Tuesday to the society as a whole. These standards after acceptance by the society in meeting became accepted practice of the industry as soon as they are confirmed by a mail vote of the membership.

War conditions and the speeding up of production for war work had its influence on practically every recommendation of the Standards committee, and some of the standards, particularly those of the aeronautic division, were frankly war measures. Likewise, the papers presented at the professional session Tuesday afternoon, were all military or naval in their bearing. The engineers listened to a talk by Henry R. Sutphen of the Elco Boat Building Co., who told how his concern turned out 550 submarine chasers within a very short time for the British navy, and gave an inkling of what is being done towards combating the German submarine menace. H. L. Horning of the Waukesha Motor Co., who is a member of the Advisory committee of the Council of National Defense, presented a new view of the relation between tractors and the food problem. Both Horning's and Sutphen's papers were illustrated by motion pictures.



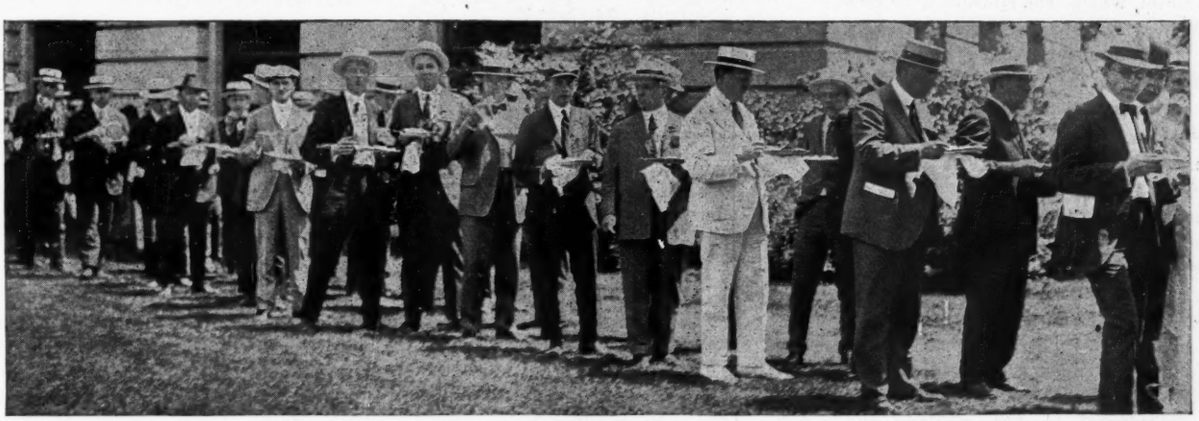
Secretary of Commerce Redfield, left; and S. W. Stratton, Chief of the Bureau of Standards, who welcomed the motor men

Quite naturally, aviation was foremost among the subjects under consideration, and the representatives of the allied industries received first-hand accounts of the problems of the allied forces in Europe in developing warplanes and how necessary it is that the allies keep one step ahead of the enemy in aviation, if their armies are to be successful.

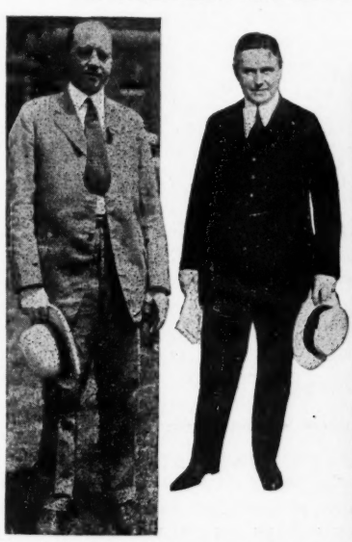
Both the French and English aviation forces were represented at the meeting. Wing Commander I. W. Sedden of the British Commission presented a paper on "Aircraft in War Time," and Lieut. Amaury de la Grange of the French Commission, told the engineers of the uses of the various types of battleplanes.

Two other papers were scheduled for presentation, one of these being "The Lessons of the War in Truck Design," by W. O. Thomas, and the other, "Kerosene-Burning Tractor Engine Fundamentals," by C. E. Sargent. These two papers, on account of lack of time were not read at the meeting. All of these, however, will be printed in abbreviated form in later issues of MOTOR AGE.

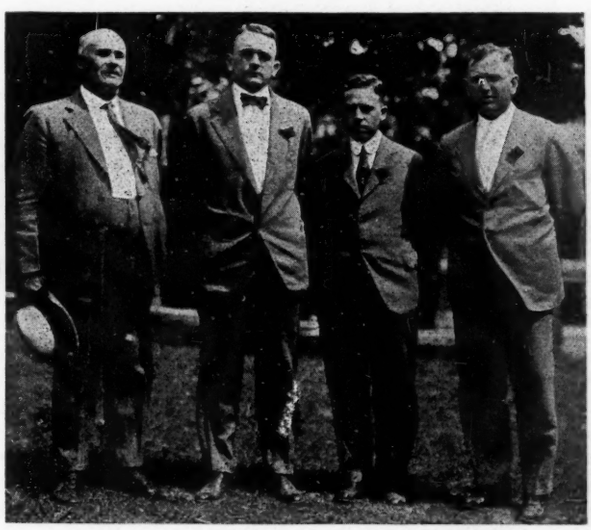
Military uniforms of Europe and America mingled when the Autom otive Engineers of the United States and its allies met for war work. From left to right—Major Abraham of the French Commiss ion; Major W. F. Hase, of the Aviation Corps; Col. Seddon, Wing Commander, British Aviation Corps; Major William Guy Wall, Ordnance Officers Reserve Corps, Chief Engineer National Motor Vehicle Co.; Lieut. De la Grange, of the French Commission; President Dunham, Society of Automotive Engineers; H. L. Horning, in charge of farm tractor work of the Council of National Defense, President Waukesha Engine Co.



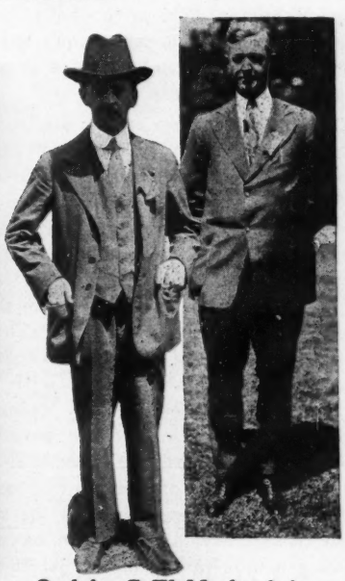
The Bread Line. Members of S. A. E. are served with progressive buffet lunch at Bureau of Standards



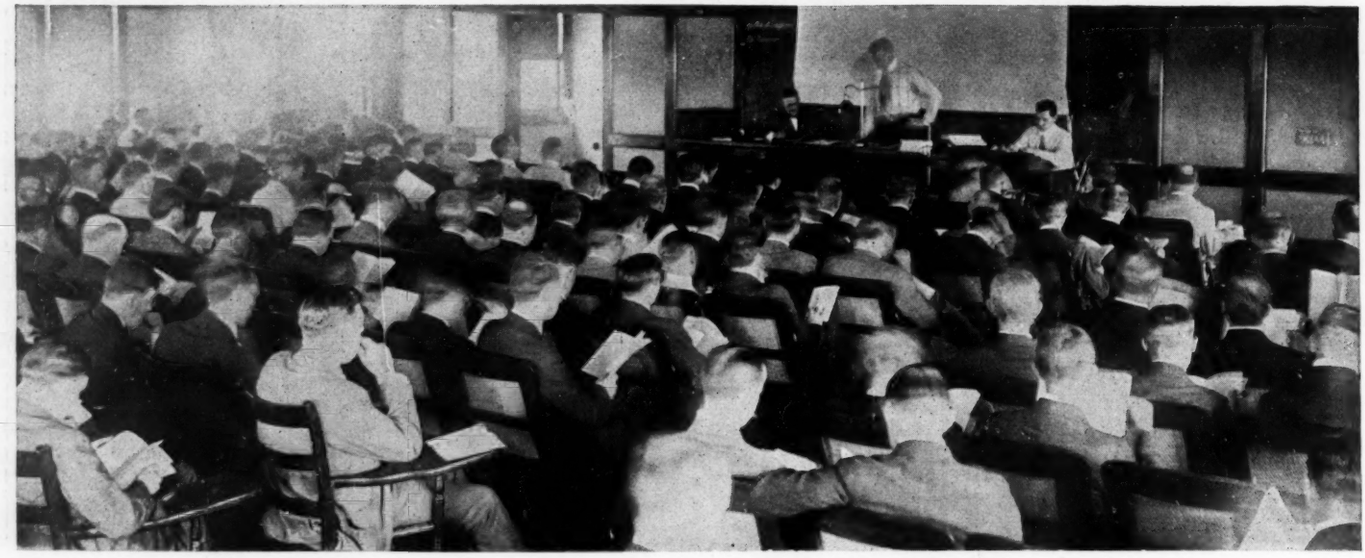
At left—Arthur J. Schley, one of the government engineers in charge of motor transportation of airplanes and balloons by motor truck. At right—Henry R. Sutphen submarine chaser builder



Four of the men who are building the country's tractors. From left to rgiht, these are: J. W. Gray, Gray Tractor Mfg. Co.; Fred Glover, Emerson-Brantingham Co.; P. H. Greer, Greer-Robbins Co.; H. L. Brunger, Aultman-Taylor Machinery Co.



On left—C. W. Manly, chairman Aeronautical Division, S. A. E. On right—J. G. Utz, chairman Standards Committee, S. A. E., Chief Engineer, Standard Parts Co.



Standards committee of the Society of Automotive Engineers in session at Bureau of Standards, Washington

The climax of the convention came at the banquet Tuesday night, at the New Willard hotel, which was addressed by Secretary of War Newton D. Baker, and every one of the 700 members and guests left the meeting with the feeling that he is to become an important unit of the war plans of the nation.

The meeting as a whole was the best attended of any in the history of the Society, and represented a very much broader range of interest than has taken part in previous sessions. This was on account of the newly broadened scope of the society, as evidenced by its change of name from Society of Automobile Engineers to Society of Automotive Engineers, which came about with the affiliation, at the government's request, of tractor, airplane and other allied engineers of the internal combustion engine field with the motor car engineers. The organization has now grown to a total membership of over 3,000 and is rapidly increasing.

One of the features of this session which distinguished it from those of previous years was the very noticeable sprinkling of officers' uniforms among those in attendance. This was accounted for by the large number of the members of the society who are now in active service, and in lines for which their professional service has particularly fitted them. This was commented upon by President George Dunham, in the powerful address with which he opened the meeting. He pledged the support of the society to the government in its efforts toward the successful prosecution of the war, and mentioned many of those who had already entered the service from the society, all of whom have been leading figures in the motor car industry.

S.A.E. Men in Khaki

There are six past presidents of the society taking important part in government work. These are A. L. Riker, chief engineer of the Locomobile Co., who is now a member of the Naval Consulting Board; Howard Coffin, of the Chalmers Co., who is a member of the Advisory Commission of the Council for National Defense and Chairman of the Aircraft Production Board; Henry Souther, formerly consulting engineer, senior officer of the Aircraft Engineering Division of the Aviation Section of the Signal Corps, with the rank of major; Howard Marmon, of Nordyke & Marmon, is with the Aircraft Engineering Division; H. W. Alden of Timken-David-Brown Bearing Co., has been made a major in the Ordnance Officers' Reserve Corps; W. H. Vandervoort of the Moline Automobile Co., who is serving on the Munitions Board of the Council of National Defense.

President George Dunham is the civilian member of the Board for Motorizing Field Artillery at the Bureau of Ordnance.

Other officers and former officers of the motor car men's organization are former S. A. E. Vice-President Zimmerschied of the General Motors Co., is vice-chairman of the Automotive Transport Committee of the Council of National Defense. Former Vice-President William G. Wall, of the National Co., is now major in the Ordnance offices of the Reserve Corps. Vice-President Vincent of the Packard Co., is doing government work in aviation at the Bureau of Standards.

There are many other of the engineers who are devoting all or a large part of their time to government service, and it is anticipated that the list will be even greater within a few months.

Co-operation between the government and the society was brought out by Dr. Stratton, chief of the Bureau of Standards, who made the point that the Society of Automotive Engineers was doing a greater work for the government than any other technical or engineering society.

One of the most interesting addresses heard at the meeting was that of Edward A. Deeds, chairman of the Airplane Construction Board, at the banquet Tuesday evening. He outlined the activities of the Aircraft Construction Board which was organized in May. It consisted of four civilian members, namely, Howard Coffin, Sidney D. Waldon, Mr. Montgomery and Edward A. Deeds, and of one representative each of the Army and Navy—General Squires and Admiral Taylor. It was the policy of the board not to create any new machinery of administration but to mesh into the machinery already existing at Washington.

Airplane Construction Board

As a result of the work of the board during the past 5 weeks, there had been formed so far eight cadet schools at various universities in the country, at which were offered 8-week courses on the principles of aviation and military tactics. Every Monday morning twenty-five young men started at each school. So far, work on four large aviation schools has been started, at Dayton, Ohio; Chicago, St. Louis

WHAT ENGINEERS DID

STANDARDS ADDED

Aeronautic
Ball and Roller Bearings
Chains
Data Sheet
Electrical Equipment
Engine
Lighting
Miscellaneous
Research
Starting Battery
Tire and Rim
Tractor

PAPERS PRESENTED

Submarine Chaser Construction
Henry R. Sutphen
Tractors and the Food Problem
H. L. Horning
Aircraft in War Time
I. W. Seddon
Uses of Battleplanes
Lieut. Armaury de la Grange

PAPERS TO BE PRINTED

Kerosene-Burning Tractor Engine Fundamentals
C. E. Sargent
Lessons of War in Truck Design
W. O. Thomas

and Detroit. At Dayton over 3000 men are at work on a tract of 2500 acres, which included the original flying field of the Wrights, of 80 acres, with a solitary hangar. Eventually there would be a row of hangars at Dayton 1½ miles in length.

Two types of planes have been laid down for primary training, and 2000 of these will be ready by Jan. 1. Some advance training is also to be given with combat machines or battle planes. A short time ago 100 of the best mechanics from the different motor car factories of the country were sent abroad to study the construction of airplane motors in foreign shops. They were accompanied by ten men in charge of the expedition.

The board had its choice of three methods of procedure, and all three would be employed at the beginning. First, it could develop and continue the existing types of airplane engines; second, it could get designs from abroad and duplicate these; third, it could develop a new American design of engine, and work along these lines was proceeding at the Bureau of Standards.

An interesting feature of the dinner was a book of patriotic songs, decorated with sketches of motorized war implements of different kinds, which was distributed by the Gurney Ball Bearing Co.

Slight Changes in New Standards

The various standards which were recommended to the Standards committee on Monday were taken up by the Society as a whole on Tuesday and in the main, were adopted, as originally reported. The importance of this work may be gained from the address of Chairman J. P. Utz, of the Standards committee, who stated there were 114 standards which had been adopted for manufacturers' practice in passenger car work, seventy-seven for trucks, sixty-seven for motor boats, fifty-one electrical and fourteen in aeronautics. The tractor standards which have been adopted, with the exception of the formality of the mail vote, are to be added to this. Mr. Utz predicted that there would be an addition next year in the number of standards on motorcycles and stationary gas engines.

There was an alteration in the report of the starting battery division, as approved by the Standards Committee and reported in MOTOR AGE last week. The original recommendation included the mention of the location of the battery. This was thought to be inadvisable by the general meeting, and all mention of the point at which the battery is to be situated on a car, was withdrawn. One point in the discussion which brought about this change, was the statement of C. W. McKinley, chief engineer of the Willys-Overland Co., that it was the experience of his company that the battery was better located in the body than on the chassis, on account of greater freedom from mud, and also because of the greater ease in giving it proper attention.

There was also a slight alteration in the report of the Tire and Rim division, which furnished a table of carrying capacities and inflation pressures for pneumatic tires. The table as recommended by the Standards committee gave the inflation pressures as maximum. This word was altered to read "corresponding," so that the table now gives the size of the tire in inches, the maximum load in pounds per car, and the corresponding inflation pressure in pounds per square inch.

In tractor standards, the original recommendation was 2⅓ m.p.h. for standard tractor speed. This was changed so that the statement now stands for a tractor speed standard of 2⅓ m.p.h. for tractors having 15 drawbar h.p. or less.

The standards recommended by the Lighting division were added to by the voltage classification for batteries as 6-8 for three cells, 8-10 for four cells, 12-16 for six cells, and 18-24 for nine cells. Sizes for bulbs were standardized as follows: Vertical bulbs for headlights shall have a minimum diameter of 1½ in., and a maximum of $2\frac{1}{16}$ in.; side bulbs shall have a maximum diameter of 1 in. and instrument and tail light bodies a maximum of ¾ in.

Aeronautic Report

The report of the Aeronautic division, which at the present time is of the utmost importance, and upon which the government is urging most rapid work, was of highly detailed nature, and was adopted almost in its entirety. A few unimportant items were referred back to the committee for revision, and most of the discussion being upon standard nomenclature.

Design and Production of Aircraft in Wartime

By Wing Commander S. W. Sedden
Royal Naval (English) Air Service

FROM what I have so far read and heard, I have gathered, perhaps quite wrongly—indeed, I sincerely hope so—that manufacturers here are far more anxious to reproduce standard types of aircraft than to enter the field as designers and builders of original types of aircraft.

However that may be at the moment, I am perfectly certain that very shortly after a firm has learned to turn out a good standard article that it will be attacked by the most exhilarating of all microbes, to wit, the microbe which makes men design aircraft that shall go one better than anyone else's.

For the moment then I want to deal with the design of military aircraft in wartime.

We may well start out with one of the proved facts of aerial warfare: "The command of the air rests very largely indeed with that side that produces the best single-seater fighter." Provided, of course, that it is produced and used in sufficient quantity.

This state of affairs is so clearly recognized in France and Great Britain that particular attention is devoted to the improvement of this type, with the result that new and improved designs are now being built and tested as fast as possible. This results, of course, in many new designs being produced, of which, however, only a few show outstanding merit and are consequently reproduced in quantity. Of the designs hitherto popular some have survived a year, some six months, and some have only had a life of usefulness on the western front of three months.

The designs that have lasted a year have always finally overstayed their welcome, and I think that probably we shall find a "vogue-period" for the single-seater fighter type to be never more than six months in the future.

The real reason of this is, of course, that it takes the enemy not more than six months in which to get to know all about any particular type and copy or improve it, if he has not already something better of his own. Then something better has to be forthcoming or command of the air will have to be conceded.

The same line of progress certainly applies to other types of airplanes than the single-seater fighter, as also to various types of seaplanes, but to a far less extent; it is unnecessary to labor the point.

It is clear then that the designer, particularly the designer of the small fighting airplane, whether he be in France, Great Britain or America, is always confronted with the problem of designing a type that is an advance on any contemporary machine of a similar type. A machine can be an advance on a similar type in one of two main respects:

(a) Because it possesses a better performance.

(b) Because its fighting facilities are better. Each of these main headings includes a number of subdivisions; thus better performance may mean better climbing only or better speed only or greater endurance or any combination of these, while better fighting facilities may mean better maneuvering capacity or better view or better positions for guns or improved weapons or any combination of these.

The designer then who sets out to design a new type must proceed along one or more of the following general lines:

(a) Increase the horsepower-weight ratio.

(b) Decrease the wing or structure resistances.

(c) Devise a new arrangement of the supporting planes, with regard to the position of pilot or crew.

Improvement in the horsepower-weight ratio is most readily achieved by the utilization of greater horsepower or engines lighter per horsepower than those employed in the type he is designing. It is said most readily achieved, and this is because progress in aviation engines is still fairly rapid. But a good deal can be done by close and accurate design, which implies the removal of all redundant weight.

Improvement in wing resistance is a matter for the wind-tunnel experimentalist and not for the designer, but the converse has actually been true in a great measure in the past.

Improvement in structure resistance requires the designer and the wind-tunnel experimentalist to work closely together, but it involves in any case the reduction of exposure of engine parts, external fittings and controls, besides the accurate shaping of the body and the simplification of the chassis, which are matters entirely for the designer.

Variation in arrangement of supporting surfaces. It is possible to vary the arrangement of the planes in an infinite number of ways, but the prime object in view is practically always to improve the view of the pilot, and roughly therefore the favored types are the parasol monoplane, the biplane with planes of unequal chord and the heavily staggered triplane. It is probably true that the practically unstaggered equal-planed biplane with a gap equal to the chord and an aspect ratio in accordance with the gross weight, running from about five in

(*Concluded on page* 25)

Latest Word in Aviation Engines

Lifting of British Censorship Permits Description of Sunbeam-Coatalen Model

LIFTING of the British censorship on publication of details of the new eighteen-cylinder Sunbeam-Coatalen overhead-valve aviation engine permits us to show on these pages views of what is considered to be the very latest word in aerial motive power. These engines are the product of Louis Coatalen, engineer of the Sunbeam factory, excerpts from whose talk on aviation engines before the Aeronautical Society of Great Britain were given in MOTOR AGE, issue of June 14.

Illustrations on these pages show only the eighteen-cylinder engine, which develops 475 hp. on the brake. However, the same design is used in the twelve-cylinder 350 hp. engine and the six-cylinder 170 hp. engine. The large engine illustrated herewith is of the greatest interest, because it is probably the most powerful single engine ever produced for airplanes, and also because it is the first example of which details have come to this side of what is known as the "broad arrow" type of engine, that is, the use of three sets of blocks of six cylinders, having a common crankcase.

All these are interesting alike for the points they possess which may be of service to motor car engine production in the future and for the features in which they must differ from that which is suitable for car practice.

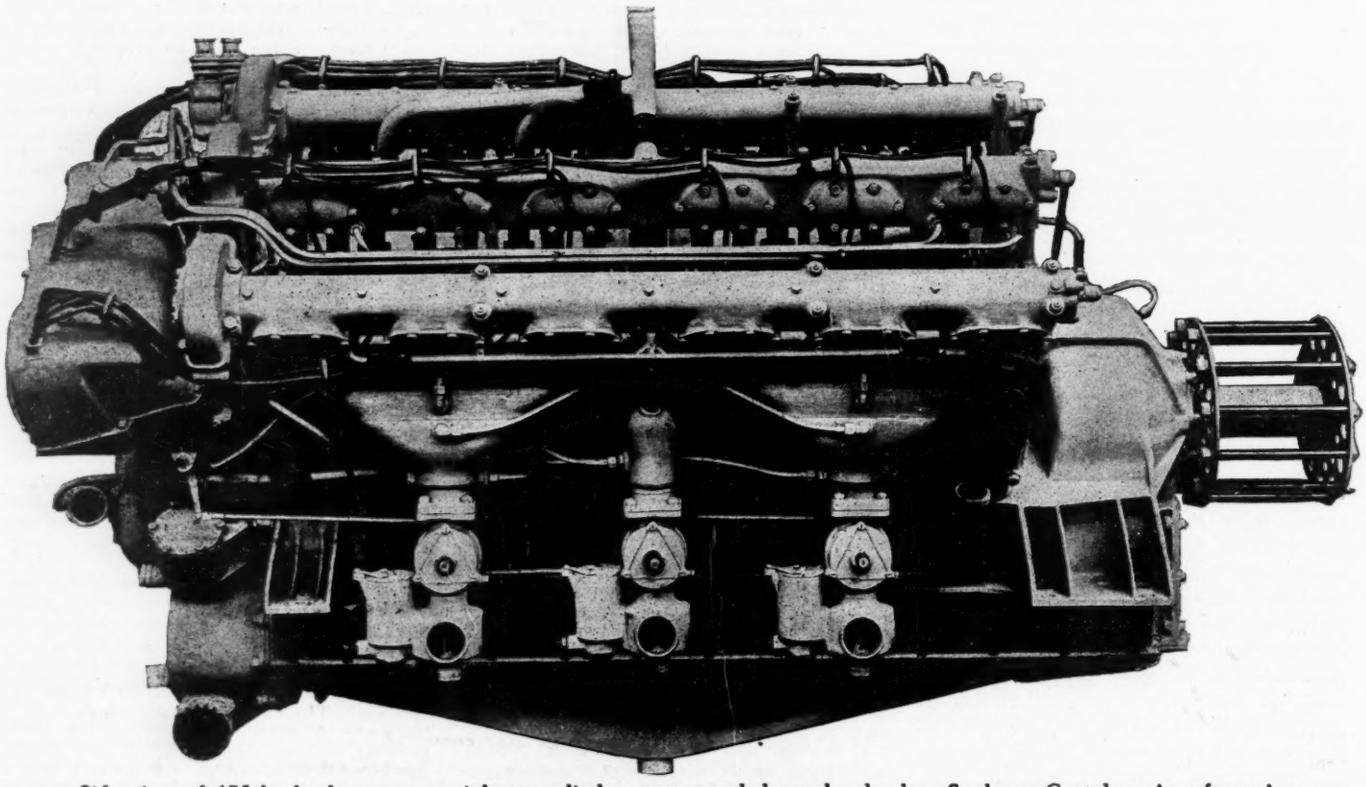
In regard to all the types of engines the crankcase and nose piece are cast in one, whereby there is achieved the dual gain of lightness and proportionately greater rigidity, to say nothing of accessibility and so forth. In these features such engines must always differ from motor car practice. Another point concerns the absence of flywheels. The engine base, on the other hand, which is a dry sump in combination with a compound pump at the bottom, represents a scheme which may become a feature of standardized motor car engine practice at some future period. Every example of this series of Sunbeam-Coatalen aircraft engines has overhead valves on the principle of two inlet and two exhaust valves per cylinder, with the spark plug set in practically the ideal position.

Low Fuel Consumption

The gasoline and oil consumption is notably low, as is the weight per horsepower, particularly in face of the handicap under which British manufacturers have to work nowadays owing to the relative unreliability of magnetos.

Thus in regard to the eighteen-cylinder overhead valve Sunbeam-Coatalen aircraft engine of 475 brake-horsepower, there are no fewer than half a dozen magnetos. Each magneto is inclosed. Two sparks are furnished to each cylinder from independent magnetos. On this engine there are six carbureters. Shortness of crankshaft, therefore of engine length, and absence of vibration are achieved by the linking of the connecting rods. Those concerned with three cylinders in the broad arrow formation work on one crankpin, the outer rods being linked to the central, master, one. In consequence of this arrangement the piston travel in the case of the central row of cylinders in 6¼ in., while the stroke of the pistons of the cylinders set on either side is in each case 6⅝ in.

The duplicate ignition scheme also applies to the twelve-cylinder 350 brake-horsepower Sunbeam-Coatalen overhead-valve aircraft engine type. It is distinguishable, incidentally, by the passage formed through the center of each induction pipe for the spark plug in the center cylinder of each block of three. In this,



Side view of 475 brake horsepower eighteen-cylinder, water-cooled overhead-valve, Sunbeam-Coatalen aircraft engine of the broad arrow type

as in the eighteen-cylinder and the six-cylinder types, there are two camshafts for each set of cylinders. These camshafts are lubricated by low pressure and are operated through a train of inclosed spur gears situated at the magneto end of the machine.

The six-cylinder, 170 brake-horsepower, vertical Sunbeam-Coatalen type employs the same general principles, including the detail that each carbureter serves gas to a group of three cylinders only. It will be observed that this engine presents notably little head resistance, being, therefore, particularly suitable for multi-engined aircraft.

The public has more or less the impression that aircraft engines of 100 and 150 hp. are sufficient for the needs of this war; whereas the series of engines in question —which are only a few of the war-time Sunbeam-Coatalen models — reveals how very much greater have been the demands made on aircraft engine builders. It is one thing, however, to make a demand and another guess matter to find that the engineer and constructor can between them meet it.

ASKS AIRCRAFT COMMISSION

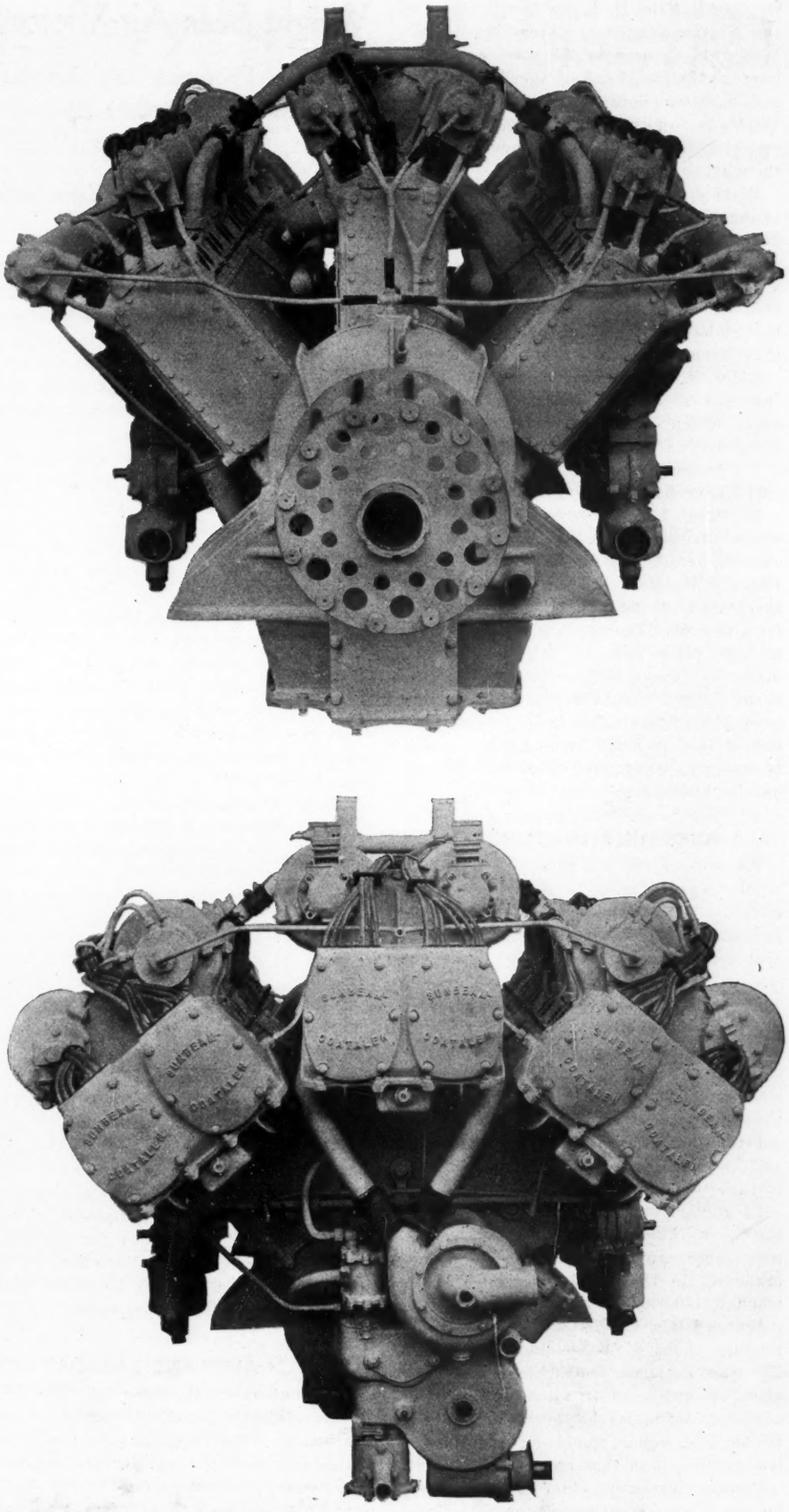
Washington, D. C., July 2.—As a counterstroke to the opposition voiced by Secretaries Daniels and Baker to the establishment by Congress of a separate department and Secretary of Aeronautics, Senator Sheppard of Texas and Congressman Hulbert of New York have introduced in the Senate and House respectively a joint resolution for the appointment of a commission to study needs of aeronautic development in the United States. The bill asks that the committee include three senators, three representatives, a brigadier general, a rear admiral and a mechanical engineer.

The administration's $600,000,000 bill for a great air fleet will provide for a broad expansion of the powers to be exercised by four big goverment boards, whose activities are to be closely co-ordinated in perfecting the general aircraft scheme. These boards are the national advisory commission, the aircraft production board of the Council of National Defense, the joint board of the Army and Navy on cognizance and the airplane technical board.

Decision to lodge the widest authority in these bodies and to make them the directing force in carrying to completion the aircraft plans was reached following a conference between Rear-Admiral D. W. Taylor, chief constructor of the Navy; Brigadier-General G. O. Squiers, chief of the signal corps of the Army, and leaders of the Senate and House.

ARRANGE WILLYS-CURTISS MERGER

Toledo, Ohio, June 29—John N. Willys, president of the Willys-Overland Co., probably will be made president of the Curtiss Aeroplane Co. July 15. This announcement follows a meeting held this



Above—Propeller end view of Sunbeam-Coatalen engine. Three rows, of six cylinders each, are set on a common crank case. The two overhead camshafts for each row with spark plugs over center of cylinder bore are distinctive features. Below—Magneto end view of Sunbeam-Coatalen engine. Six magnetos are contained in patent water-tight casings and furnish two independent sparks through two independent plugs

week in Buffalo, N. Y., by the directors of the Curtiss company. According to Mr. Willys, if he accepts the presidency William A. Morgan, head of the Buffalo Copper & Brass Rolling Co., in which Mr. Willys is largely interested, will be made vice-president and general manager of the Curtiss company.

Plans are being arranged for the merger of the Willys and Curtiss interests and 63,000 shares of common stock of the Curtiss company is to be marketed at $35 to provide additional working capital of $2,205,000. The Curtiss company announces that it has received a $20,000,000 airplane order from the United States government.

Glenn H. Curtiss announced at the meeting that he is developing a new fighting plane which will operate at a speed of 150 m.p.h.

MEXICO REVIEWS TRACK RACES

El Paso, Tex., July 2—The revival of motor car racing on the race track at Juarez, across the Rio Grande from El Paso, promises to provide amusement for the people of the two cities and visitors from now on. The opening races there are to take place July 4. Melchor Herrera, mayor of Juarez, will be in charge of the event. More than fifty drivers have entered the different contests. The track has been placed in first-class condition, and it is expected that the races will be unusually exciting.

THINKS OIL SITUATION BAD

Washington, D. C., June 30.—Secretary of the Navy Daniels is authority for the statement that within a short time the government must commandeer the oil and coal supply unless it can make some arrangement to get its supply and fix the prices. All the larger nations of the world are now constructing oil-burning war vessels and this country has 200 under construction, he said. If the government cannot get oil, however, it will be necessary for the department to change its policy and substitute coal-burning ships. This, he said, would result in their being inferior to those used by other countries.

Lieutenant-Commander Richardson of the naval bureau of steam engineering, says there are about 380,000,000 bbl. of crude oil in the naval reserve. Of this amount 130,000,000 bbl. are in the unpatented lands, which, when refined, would produce about 40,000,000 bbl. of fuel oil. This he declared, would last the navy about seven years if all were available at once. He added however that at least twenty-five years would be required to remove the oil in that reserve.

Chester Narramore, chief of the engineer bureau of mines, estimated the war would result in an increased demand for oil amounting to 20,000,000 bbl. over the amount needed in America in normal times. He declared the practice of the navy in burning oil under the boilers of war vessels is a great waste.

Wright Sees Air Victory

Indorses Program of Aircraft Production Board as Necessary to Success

Would Blind Enemies' Eyes with Swarm of Planes

WASHINGTON, D. C., June 30—In indorsing the program of the aircraft production board Orville Wright declares that "if the allies' armies are equipped with such a number of airplanes as to keep the enemy planes entirely back of the line, so that they are unable to direct gunfire or to observe the movement of the allied troops it will be possible to end the war.

"When my brother and I built and flew the first man-carrying machine," said Mr. Wright, "we thought that we were introducing into the world an invention which would make further wars practically impossible. Nevertheless the world finds itself in the greatest war in history. Neither side has been able to win on account of the part the airplane has played. Both sides know exactly what the other is doing. The two sides are apparently nearly equal in aerial equipment, and unless present conditions can be changed the war will continue for years.

"However, if the allies' armies are equipped with such a number of airplanes as to keep the enemy planes entirely back of the line, so that they are unable to direct gunfire or to observe the movement of the allied troops—in other words, if the enemy's eyes can be put out—it will be possible to end the war. This is not taking into account what might be done by bombing German sources of munition supplies, such as Essen, which is only about 150 miles behind the fighting lines. But to end the war quickly and cheaply the supremacy in the air must be so complete as to entirely blind the enemy.

"The program laid down by the aircraft production board, if carried out, will obtain this result. The business organization and manufacturing equipment of our country offer the facilities for carrying out this program, and I believe that by no other method can the war be ended with so little loss of life and property."

TO BUILD AIRPLANE LABORATORY

Washington, D. C., June 28—The National Advisory Committee for Aeronautics has closed a contract with the J. G. White Engineering Corp. for the erection of a research laboratory on Langley Field near Hampton, Va. In addition to testing airplanes and airplane parts, scientific research peculiar to aeronautics will be conducted under the immediate supervision of the committee.

Instruments for use on airplanes to measure the various quantities which enter into the performance of a plane when in free flight are being designed now. These measurements will include the thrust developed by the propeller, the power absorbed and the revolutions, also the various movements made by the control levers and the resulting motion of the plane.

A wind tunnel of the Eiffel type will be erected for model tests on airplanes, surfaces and propellers. The results of tests on models and full-sized surfaces will make it possible to determine more accurately the laws by which results from model tests may be applied to full-sized machines and surfaces.

The laboratory will include complete machine, instrument and pattern shops, as well as a drafting room, with the most modern equipment.

CURTISS SCHOOL FOR NAVY

Washington, D. C., June 30—The Curtiss school will within a few days become an airplane training station for the United States navy. Details are lacking. However, it is stated that the station will no longer train civilian or army flyers and will be used exclusively for the training of airmen for the United States navy.

The nature of the agreement of the Curtiss company with the government is not known, but it is said that the station will be operated by the concern under the direction and supervision of the Navy Department. Captain Baldwin is now in Washington making final arrangements for the transfer.

MAKERS TAKE INVENTORY

Detroit, Mich., June 30—The Chalmers Motor Co. has shut down production, beginning today, July 9, when it will commence the production of its new series. During the last ten days the company will make inventory. Dodge Bros. have closed their plant to take stock and will resume production July 6. The Cadillac Motor Car Co. is closing its plant for two weeks to take stock and will then commence production of its 1918 series.

BULL TRACTOR IN MERGER

St. Louis, Mo., July 2—Contracts were signed Saturday completing the merger of the Whitman Agricultural Co., of this city, with the Bull Tractor Co. and the Toro Motor Co., of Minneapolis, under the name of the Whitman-Bull Tractor Co. The new company is incorporated in Delaware with a capital stock of $1,250,000 and with 12,000 shares of common stock of no fixed par value. The company will use the Whitman plant, which consists of buildings with more than 200,000 sq. ft. of floor space. The site has a frontage of 600 ft. on the river, which is deemed an advantage as much of the shipping is expected to be by water.

P. J. Lyons, organizer of the Bull Tractor Co., is president and general manager of the new company. Other officers are: Vice-presidents, H. L. Whitman, Sr., St.

Louis; James W. Lyons, Chicago, and P. H. Knoll, Minneapolis; secretary and foreign sales manager, H. L. Whitman, Jr.; treasurer and chairman of the board, Lawrence B. Pierce. These officers and W. A. Bust, an investment broker of St. Louis; I. N. Orr, of the St. Louis Union Trust Co., and J. L. McCarthy, a grain merchant of Duluth, compose the board.

The Bull Tractor Co. was organized in 1914 as a selling concern. The Whitman Agricultural Co. began manufacturing implements in Maine in 1832, when Luther Whitman opened a factory at Augusta. The company has been located in St. Louis since 1870 and was one of the first companies to manufacture reapers.

ORGANIZE TO HELP GOVERNMENT

New York, June 30—The Engineering Council has been formed as a department of the United Engineering Society and will act as a medium of co-operation between the four societies of civil, mining, mechanical, electrical engineers and consider ways and means by which the societies may be of use to the nation. Twenty-four members compose the council. The officers are: President, I. N. Hollis; vice-presidents, H. W. Buck and George F. Swain; secretary, Calvert Townley.

FARM TRACTORS FIRST

Washington, D. C., June 29—Preference must be given farm tractors in transportation as well as preference in the furnishing of materials from which tractors are made if any material results are to be accomplished by the movement to aid in the production of crops during the war by the move extensive use of such tractors, according to Arnold Kerkes of the Bureau of Farm Management, Department of Agriculture. Agricultural machines, Mr. Arnold said, were supposed to have been given preference in transportation plans made, but apparently tractors were not included.

A CENT A GALLON

New York, June 30—Louis Enright, who announced in April, 1916, that he had discovered a cent-a-gallon substitute for gasoline, has disposed of a half interest in his invention to Benjamin F. Yoakum.

Mr. Enright says that the delay in placing the gasoline substitute on the market was due to the fact that he had been tied up for a year by an option on the commodity he had sold to the Maxim Munitions Corp., which expired April 28. He has been working to discover a chemical that will, when compounded with the gasoline substitute, prevent any chemist from analyzing the green fluid.

Enright said he asked the Maxim corporation to pay $1,000,000 cash in advance of the delivery of the formula and an annual income for seventeen years equivalent to one-eighth of a cent for every gallon of gasoline sold in this country at the time of the deal, or about $400,000 a year.

Both Army and Navy Fly

Seaplanes of Tractor Type Train Officers and Men in Flying Corps

Owners of Airplanes Among Those Who Seek to Enlist

WASHINGTON, June 29—Seaplanes of the tractor type, which are really flying boats, are being used, as well as various types of aircraft in regular military training, in the training in flying which is being given prospective officers and men in both the Reserve Flying Corps and the Naval Flying Corps.

College men, motor car salesmen, mechanics, chauffeurs, men who operate their own cars and those interested in speed boats seem to be particularly anxious to get into the flying corps. A large proportion of the wealthy sportsmen who have learned to fly, a number of whom own their airplanes, have applied and they make very desirable material. Among the well-known young men who have filed their applications are J. P. Warburg, New York, son of Paul M. Warburg of the Federal Reserve Board; two sons of Henry P. Davidson, the New York banker who is a partner in J. P. Morgan & Co.; H. P. Davidson, Jr., and F. Trubee Davidson; W. A. Rockefeller, E. R. L. Gould, G. C. Depew, and J. M. Vorys, all of New York; R. A. Lovett of Boston.

Thousands have applied for enrollment in the Naval Reserve Flying Corps, and the applications still are pouring in. Over 800 applications have been received from Boston alone, a much larger number from New York, and hundreds of young men in Philadelphia, Baltimore, Washington, Chicago, Pittsburgh, Cleveland, Detroit and in fact nearly every city in the country, have applied.

The officers of the Naval Flying Corps who have been in training at the Navy Aeronautic Station at Pensacola, Fla., since last December, are just completing their first course. Most of the 250 men who were enlisted in the Navy for aeronautic duties only are also at Pensacola, undergoing instruction.

NOT ENOUGH FORDS

Boston, Mass., June 30—At a meeting of New England dealers in this city, John L. Budd, New England distributor, announced he had obtained an option on Metz cars to be used for Smith units to supply the deficiency in Ford cars. At a demonstration in Weston with a Smith Form-A-Truck tractor using a Ford a unit coupled to a Metz also was displayed.

Mr. Judd's plans call for taking the entire Metz output, which is now some fifty cars a day. The details are under discussion now, and he hopes to have it settled in a few days. The big demand for Ford machines to turn into trucks has been greater than the supply, and the attachment dealers have been forced to pay premiums on new cars, and high prices for used Fords. Mr. Judd hopes to obviate this with the Metz. The entire party made a visit to the Metz plant during the day. He also has obtained the entire United States territory for a Smith unit for Allen chassis that made a 2½-ton truck. He showed one of these combinations also at the convention.

HOW MOTOR TRUCKS SAVED VERDUN

Military experts credit the motor truck with being the chief factor in stopping the advance of the Germans before Verdun. The story of how this was accomplished as told by Bradley, MOTOR AGE'S special War Correspondent at the front, reads like an H. G. Well's romance—except that it is true—see MOTOR AGE for July 19.

EXPERTS REACH ENGLAND

Washington, D. C., June 30—The aircraft production board announces the safe arrival at a British port of about 125 experts sent from this country to acquire all possible information regarding aircraft design manufacture of both engines and planes. Men representing legal, manufacturing, designing, engineering, military and naval experience and training are in the delegation. It will be the duty of this group to gather and bring back to America as soon as possible the latest and best information regarding European aircraft development, which then can be made available for American manufacturers. Arrangement has been made for the placing of expert American mechanics in the European aircraft plants in whose products the United States is interested.

WILLYS-OVERLAND SALES CONTEST

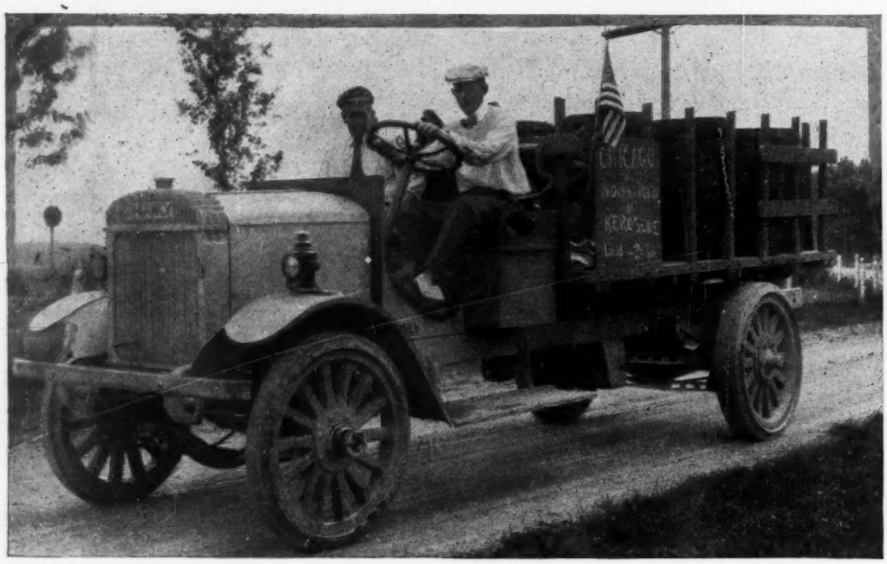
Toledo, June 30—The Willys-Overland Co. is conducting a huge retail sales contest to be concluded in August and embracing nearly every one of its 5,000 dealers and distributors in this country. Prizes will constitute free trips to the Willys-Overland factory this next September, where a program has been scheduled which will rival that of the large dealers' convention held by the company last winter.

The contest has been divided into three separate divisions with appropriate prizes in each. The first section will be for salesmen in distributors' organizations.

The contest is being run as an election, the ballots being the cars that are sold by each contestant. The cars vary in the number of points in accordance with their value.

Moves 2½ Tons 218 Miles for $3.57

Manly Makes Good Showing on Kerosene



Manly 2½-ton truck in front of George Ade's golf links near Brook, Ind.

INDIANAPOLIS, IND., June 29—Moving 2½ tons at an average speed of 14 m. p. h. 218 miles at a cost for fuel and oil of $3.57 was the mark set by a Manly 2½-ton truck which reached here this noon from Chicago. Using kerosene all the time with the exception of starting and warming up the engine materially lowered the average ton-mile cost for fuel, the average for fuel and oil for the distance being .0055 cents.

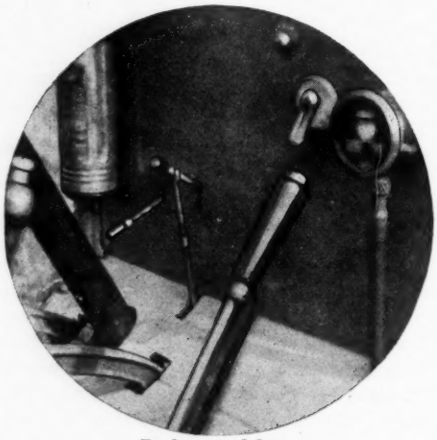
The trip was made under adverse conditions. The truck had not been tested out or run except from the factory at Waukegan to Chicago, a distance of 42 miles, and consequently was stiff. Collision with another truck just before loading damaged some forty tubes in the radiator immediately in front of the fan, which cut the efficiency of the cooling system about 30 per cent. Difficulties with brake adjustment, which might have been expected in an untested truck made the fuel consumption in the early part of the run especially high and in consequence the average is brought down. This is proven by the ton-mile cost from Lafayette here, a distance of 67.5 miles, the average being .0048 cents.

The fuel consumption for the 218 miles was as follows:

Kerosene	26⅜ gal.
Gasoline	4¾ gal.
Oil	1½ gal.

The numerous stops during the early part of the run account for the consumption of gasoline, although the figures show perhaps more clearly what might be expected in making frequent stops on short hauls.

The engine, which is a Waukesha, 4 by 5¾, four-cylinder, was equipped with two Zenith carbureters and a special intake manifold cast integral with the exhaust. In the intake manifold at a joint where the turn is made from the vertical to the horizontal a float bowl was fitted, this admitting water and air and assisting in vaporizing the kerosene and keeping down the carbon deposit.



Fuel control levers

A butterfly valve controls the fuel used and the separate carbureter for each fuel precludes the possibility of using both fuels together. A four-speed Muncie gearset and Eisemann magneto were used.

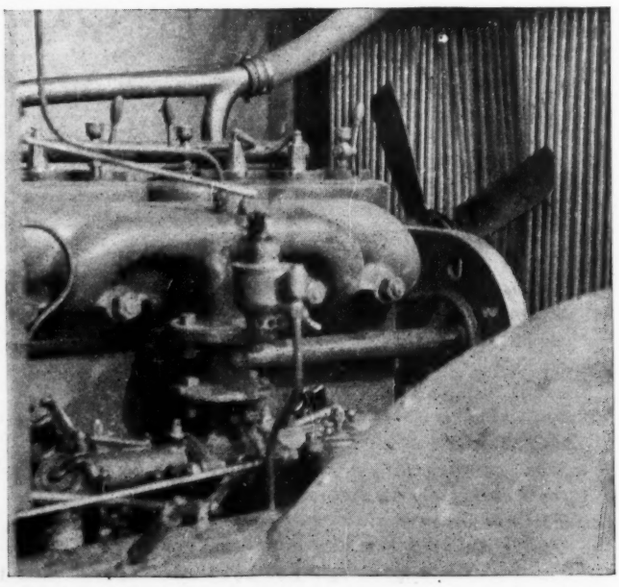
The load consisted of 5200 lbs. of pitch and the truck with its load and three passengers weighed 12,075 lbs. H. P. Manly, secretary of the Manly Motor Corp., and Joseph E. Nathan of the Illinois Auto Truck Co., Chicago, drove and a representative of MOTOR AGE acted as the observer.

A part of the distance was made in darkness, the lamp equipment of the truck consisting of two bull's-eye lanterns that gave no light on the roadway. This made necessary slower speed and called for greater fuel consumption.

Difference of Operation

Operating a truck on kerosene calls for greater manipulation of spark control and gearshift than with gasoline. Kerosene, which admittedly is a slow-burning fuel and consequently one calling for an early spark theoretically, explodes the theory with the carbureting equipment used on the Manly. The action of the heated manifold and the water atomizer seems to make the kerosene burn more quickly than the gasoline does which means that the spark lever must be considerably retarded. Invariably after starting on gasoline and running until the engine became hot, the switch to kerosene produced a knock with the same throttle opening and spark setting that was employed with the gasoline. The pickup was better on kerosene than gasoline, although on the long pull up grade called for stepping down of gears and a much retarded spark.

The return to Chicago will be begun this afternoon and a comparison of the results each way will be made. The roads during the first half of the trip here were soft, approximately a fourth of the entire distance having been made during rain.



Fuel system on Manly 2½-ton truck

Two Gallons a Day in France

Gasoline of Private Motorists Limited

PARIS, May 19—France, like England, is now living under a gasoline card system. The French system is simpler and much more generous than that in force in England. In the Republic no gasoline can be sold without the presentation of an official card indicating that the holder is entitled to make purchases. All car users are divided into two classes. In Class 1 are grouped all vehicles, civilian-owned, used in connection with national defense, or in the public interests. The regulations provide for the following: Public works, postal service, public ambulances, fire brigades, public transport, motorbuses other than those doing general touring, taxicabs within certain limitations, doctors, midwives, veterinary surgeons, charitable organizations, private ambulances, transportation of food stuffs, coal and wood; mechanical tractors and agricultural machinery, private firms working for national defense, army contractors, delivery vehicles, newspaper delivery vans and railroads.

All included in the above class will receive from the proper authorities a gasoline card allowing them to purchase any quantity within the limits of the supply on the market. In Class 2 are included all cars not mentioned in Class 1; they are assumed to be touring cars used for private ends and for pleasure touring. These motorists can apply to the prefect for a gasoline card which will be given on payment of 40 cents, this card allowing them to purchase a maximum of 2.6 American gallons per car per day. The military authorities always have power to requisition gasoline before it gets on the market and there is no guarantee that car owners in Class 2 will get the maximum allowed them. This remark also applies to individual owners in Class 1, for although the Government gives a right to purchase, it does not guarantee stocks. Big users in Class 1 always can arrange to get preferential treatment.

In addition to the limited supply to private motorists, it is announced that touring passes for the interior of France and the frontier regions will not be issued unless the journey has to be made in the interests of national defense. In no case will the pass be available for more than a month. This restriction appears useless when no car can travel more than 60 miles a day on the limited amount of petrol allowed under the card scheme.

An Idle Threat

Further, the restriction of touring licenses cannot be considered as more than an idle threat, in view of past experience. In the early days of the war, when every shadow contained a spy, guards were placed on the roads in such quantities that it was impossible to travel more than five miles without being pulled up to present a permit. When conditions had become more settled and the number of privately-owned cars had decreased by reason of requisitions and the calling of men to the colors, there was so little motor car traffic on the roads that there was nothing for the guards to do. The licenses to travel by motor car were continued, however, but they were nothing more than a formality. The owner applied to the police once a month for the renewal of his paper and on receiving it put it in his pocket and forgot about it. It was quite common for a motorist to travel daily for six consecutive months without being called upon to show his card on the road. In view of the slackness, many car owners neglected to apply for renewals. In the few places where guards were maintained they were not in sufficient numbers to be of any use. One important walled city near Paris has six outlets to the west. At one of these a military guard is maintained. Thus motorists without a touring pass choose one of the five other gates when it is necessary to pass through this city.

Card System Control

In order to inforce the restriction of touring by means of passes, it would be necessary to place guards on every main and secondary road, and the number of men would not be less than 20,000. There is such a network of roads in France and so many alternative routes to every town that no effective control could be exercised with a smaller number. The police authorities, who previously had this matter in hand, realized the impossibility of controlling motor car travel by a card system; although they maintained the cards for form's sake, they withdrew the police and guards. It is surprising, therefore, that another government department should come back to such a farcical system.

Design and Production of Aircraft in Wartime

(*Concluded from page* 19)

very small machines to perhaps ten in the very large ones, gives about the most efficient aeronautical arrangement for an airplane.

Any deviation from such an arrangement may and usually does involve greater efficiency of the supporting surfaces, but at a cost of greater weight. It is possible to make these two factors balance and perhaps even show an over-all aeronautical advantage for the unusual arrangement, but a designer has to be most intimately acquainted with every branch of aeronautics before he can attempt such arrangements with any real chance of making good against the simpler structure.

I now want to return to the subject of the reduction of wing and structure resistances, because it is in these two respects quite as much as in the matter of engine design that notable progress has recently been made by designers in France and Great Britain.

There are two ways (of these the first is by far the most important) in which wing resistance has been notably reduced, namely:

(a) By the employment of low resistance aerofoils.

(b) By properly shaping the wing tips.

To grasp thoroughly the aerofoil resistance problem it is necessary to preface that windtunnel research (following indeed in the wake of practical experiment) has now given us a very good range of aerofoils varying from the low resistance aerofoil, which carries about 5 lb. per square foot at 45 m.p.h. at its maximum lift angle, through the medium-lift aerofoil carrying round about 6 lb. per square foot under the same conditions, to the high lift aerofoil, which carries 7½ lb.

It is obvious that when the minimum speed is specified, if the aerofoil carrying 7½ lb. per square foot is utilized in place of that carrying only 5 lb. per square foot (both at 45 m.p.h., the speed usually named) that there will be a very large saving in area and consequently in weight by using the high-lift variety. Moreover, it must be borne in mind that the weight saved is not by any means confined to the saving of supporting surface, because firstly the stresses are reduced, then the tail area or length of body may be reduced. In fact, as a rough approximation it may be assumed that the saving is at the rate of 1½ lb. per square foot of area saved. This at once very materially increases the horsepower-weight ratio in favor of the high-lift winged machine.

Moreover, with the reduction in area and weight there comes improved view and ease of handling—except that in dives the high-lift wing type will have a comparatively low limiting speed.

Notwithstanding these factors, however, the resistance of the high-lift type of aerofoil is so much greater than that of the low resistance type at fine angles that as soon as the horsepower for weight is increased beyond perhaps 1 hp. to 17 or 18 lbs. we find that the speed range of the low resistance type increases far beyond that of the high-lift type.

To illustrate this point, it is quite possible that the super-scout of the near future with a low resistance type aerofoil will have a speed range of 50 to 150 m.p.h. The same machine fitted with a medium lift type curve such as R. A. F. 6 would probably achieve 50 to 125 m.p.h. and with the highest lift aerofoil 50 to 100 m.p.h. only.

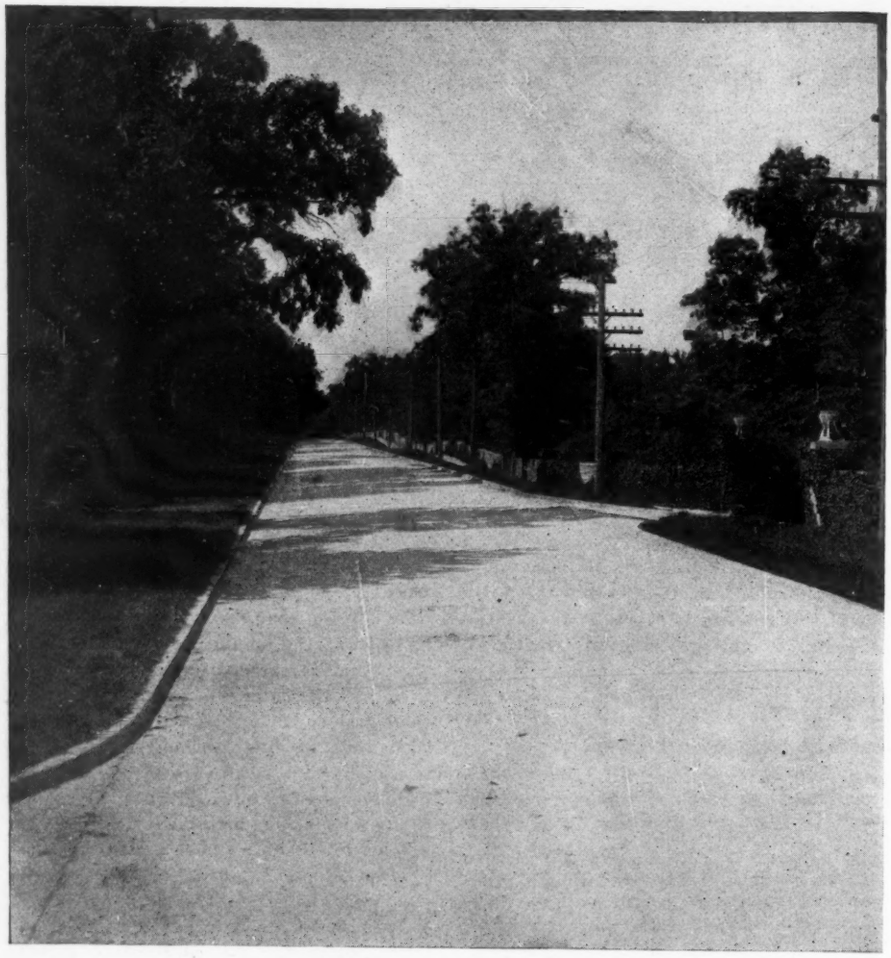
The horsepower curves for various aerofoils ranging from the lowest resistance type so far experimented with through the medium lift to the medium-high lift type illustrate clearly the point that while excess horsepower is of value in the low resistance aerofoil it becomes increasingly wasteful as the lift of the aerofoil is increased. They also illustrate how little difference there is in the climbing rates of any aerofoil despite the weight handicap carried by the low lift type.

To conclude, I urge that inasmuch as two heads are better than one, so three are better than two; consequently it is most desirable that the designers in this country be encouraged to compete in the race of producing the best fighting scout.

The field is perfectly open and the judging is above suspicion because the ultimate judgment is recognized to be in the hands of the pilots, who demand the best.

Cement Roads—Their Growth

Present Mileage 8000 Against 2500 of Brick



Stretch of concrete road between Geneva and Batavia, in Kane County, Illinois

By William K. Gibbs

CONCRETE roads, while relatively a new type of construction compared with brick, have assumed a total mileage in this country that is about three times that of brick roads. Prior to 1915 there were in the United States only 1764 miles of concrete roads, based on the average width of 16 ft. During 1915 alone 1063 miles of such roads were built, not to mention nearly 6,500,000 sq. yds. of concrete city streets and alleys. The present mileage of brick roads in the United States is approximately 2500 miles, while of concrete there are at present about 75,000,000 sq. yds. in country road construction, which would total about 8000 miles of 16-foot road. Of course, the actual mileage probably is in excess of that figure since concrete highways are built in varying widths from 8 or 9 ft. up to 18 or 20 ft., with some perhaps a little wider.

California has become a devout convert to the concrete road and now leads the country in mileage. The southern states have been piling up their mileage of concrete highways for several years and perhaps are ahead of the northern states in that respect. This is explained by a prevailing feeling that concrete roads are less effective in cold climates where freezing is likely to make concrete buckle. However, if the road is properly laid and given sufficient expansion joints, and if the material is up to that used in the best engineering practice there is nothing to fear from the concrete road in cold climates.

New England states have a large mileage of concrete roads, but Wayne county, Michigan, has a greater mileage for its size than any other county in the country. It was one of the pioneers in concrete road building. The earliest concrete pavement in the United States, of which there is reliable record, was constructed at Bellefontaine, Ohio, in 1893 and 1894. This pavement contains about 4400 sq. yds. and was laid in squares similar to that employed in the concrete sidewalk construction. It was laid in two courses and this early experiment indicated many possibilities which no doubt has been responsible for some of the construction methods in use at present.

The fact that the majority of the concrete pavements which have been laid have proved entirely satisfactory where traffic conditions were not unduly severe is serving to increase the popularity of this type of road very rapidly. This is evidenced by the following tabulation, showing the approximate number of square yards of such pavements that were constructed in the United States from 1909 to 1914:

	Sq. yd.		Sq. yd.
1909	364,000	1912	6,470,000
1910	850,000	1913	10,100,000
1911	1,800,000	1914	19,200,000

Enthusiastic advocates of concrete roads should bear in mind that such roads can never be economically adapted to all traffic conditions, and those who are in respon-

Section of National Road near Brownsville, Ohio. It shows two curves in opposite directions, connected by a short tangent. The super-elevation of the inside half of the curve in the foreground is shown to be one inch per foot. The super-elevation in the background is shown by the slant of the motor car

sible charge of road-improvement work should realize the importance of making a careful economic comparison of the various kinds of road surfaces under the conditions to be met before deciding upon the type of improvement to adopt. The principal advantages which concrete pavements possess may be briefly stated as follows:

1—As far as can be judged, they are durable under ordinary suburban and rural traffic conditions. While it is true that there are no very old concrete pavements in existence, the present condition of many of those which have undergone several years' service would seem to warrant the above statement.

2—They present a smooth, even surface, which offers very little resistance to traffic. In the past the surfaces of concrete pavements have sometimes been roughened to insure a good foothold for horses. This practice has now been abandoned, except on very steep grades, because it tends greatly to accelerate deterioration of the pavement and because the smooth surface has been found to afford a fairly satisfactory foothold under all ordinary conditions.

3—They produce practically no dust and may be easily cleaned.

4—They can be maintained at comparatively small cost until renewals become necessary.

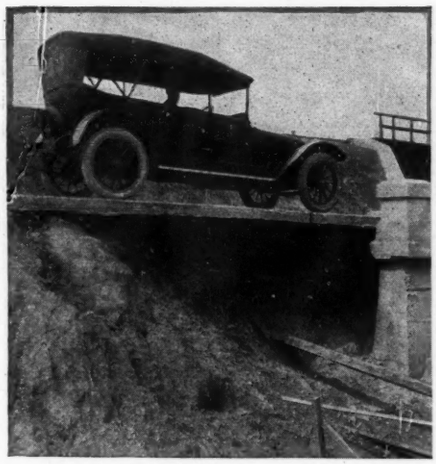
5—They may be made to serve as an excellent base for some other type of surface when resurfacing becomes desirable.

6—They present a pleasing appearance.

The principal disadvantages are:

1—They are somewhat noisy under horse traffic.

2—There is no method of constructing necessary joints in the pavements which will entirely prevent excessive wear in their vicinity. Furthermore, joints do not altogether eliminate cracking and whenever a crack develops it must be given frequent attention in order to prevent rapid deterioration of the pavement.



Properly constructed concrete road is not affected by small washouts as is evidenced by this case

3—They cannot be as readily and effectively repaired as may other types of pavements.

Vermillion county, Illinois, started 1916 by letting contracts for nearly 145 miles of concrete roads—the largest single contract ever awarded in point of concrete road mileage. Milwaukee county, Wisconsin, completed, in 1915, nearly 86 miles of concrete road. Communities having even a comparatively heavy traffic should build permanent highways. Experience shows that it is better to add a few miles of permanent roads each year than to add a continually decreasing mileage of impermanent roads, continually decreasing because the continually increasing maintenance soon uses up all available resources of road building. The road problem should be analyzed from the same standpoint as any business proposition, that is, from the standpoint of ultimate rather than initial cost.

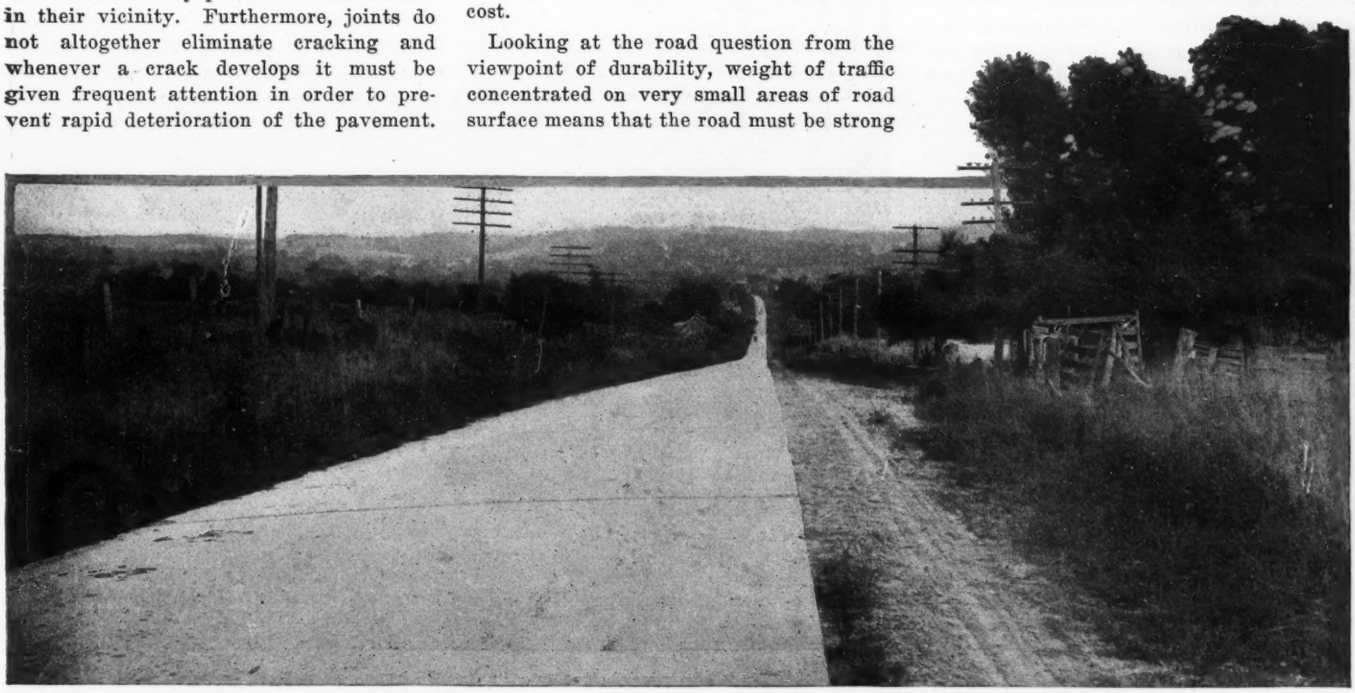
Looking at the road question from the viewpoint of durability, weight of traffic concentrated on very small areas of road surface means that the road must be strong enough at all points to support this weight and distribute the load to the sub-base over a large area. Otherwise, the weight of the load is concentrated and crushes the road. Binder for concrete roads must be strong enough absolutely to prevent surface particles from becoming dislodged by the impact of horses' hoofs or the shearing action of motor vehicle tires.

How often have you seen small pockets that ultimately wore into large holes in a concrete road. This is occasioned by using too thin a surface over a coarse aggregate. Large pieces of the aggregate reach through the surfacing to be subjected to the impact of traffic. This action loosens the aggregate, causing the surface material around it to disintegrate. Motor car tires then suck the small particles away from the pocket and eventually this works havoc with the paving unless attention is given quickly.

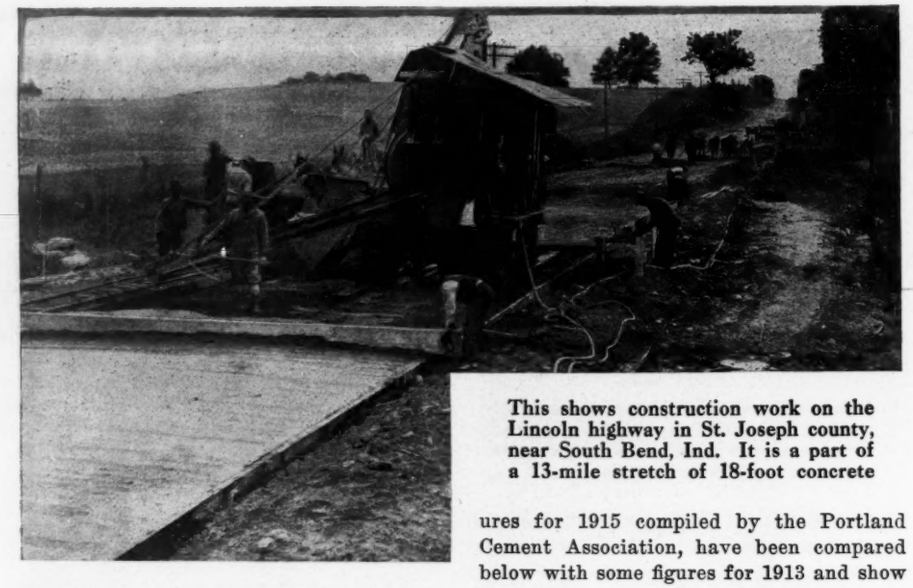
Cement will hold the particles composing a concrete road firmly together to form a solid stone, if the right depth and mixture of surfacing material is used. This means that the load, though touching only a small area, is distributed over a large area.

Properly constructed cement roads rarely crack. Such cracks, when they occur, extend across the road because joints were not correctly placed. Longitudinal cracks occur where insufficient drainage, followed by freezing, causes heaving, and where the sub-base is not properly constructed. Such cracks are unsightly and if neglected, wear under traffic, but if kept filled with tar and sand, are no detriment to the road.

Hauling on a concrete road is easy because of the even surface. A horse can draw practically twice as much on a concrete road as he can on a macadam road; three times as much as on a gravel road and five times as much as on a good clay



Here is an ideal stretch of concrete road just east of Leinville, Ohio. Note that there is considerable grade



This shows construction work on the Lincoln highway in St. Joseph county, near South Bend, Ind. It is a part of a 13-mile stretch of 18-foot concrete

road. Concrete roads need be crowned only slightly in the center to allow surface water to run off. The slight crown makes the entire width of the road available for traffic. Roads of gravel and macadam require a high crown, thus increasing the danger of side-slipping both of horses and motor vehicles. This danger is largely avoided on a concrete road because of the slight crown. Grades as steep as 22 per cent have been paved with concrete, which gave sufficiently secure footing for horses, so the objection on account of slipperiness is unfounded.

The cost of permanent road construction looks formidable to many communities, but that leads a community to not build any but a permanent road. Good roads enhance the value of the property they reach, just in proportion as improved streets enhance the value of city property. The writer recalls an instance of a prominent land owner in Missouri stating in a road meeting that he would willingly contribute $1 per front foot toward the construction of a permanent road past his property. He realized the value that would come to him and he had a mile of frontage on the road in question. The man across the road from him could afford as well to pay a like amount, which would mean $10,560 toward the building of a road, which if made of cement, would not cost much in excess of $15,000. Adjoining property would benefit to a certain extent and it therefore seems as if property owners should be willing to pay for permanent road construction if it enhances the value of their acreage. Permanent roads are like money in the bank to the farmer. They make it easier for him to market his produce, helping him to haul larger loads more quickly.

Figures based on actual concrete road construction carried on under varying conditions and in many sections of the country, show that such roads, based on a 16-foot width, average in total cost $15,000 per mile complete. Construction cost figures for 1915 compiled by the Portland Cement Association, have been compared below with some figures for 1913 and show the average cost of concrete roads per square yard. These figures in some cases represent all cost incidental to construction, that is they include cost of foundation, drainage and road shoulders; in other cases they represent the cost of placing concrete only:

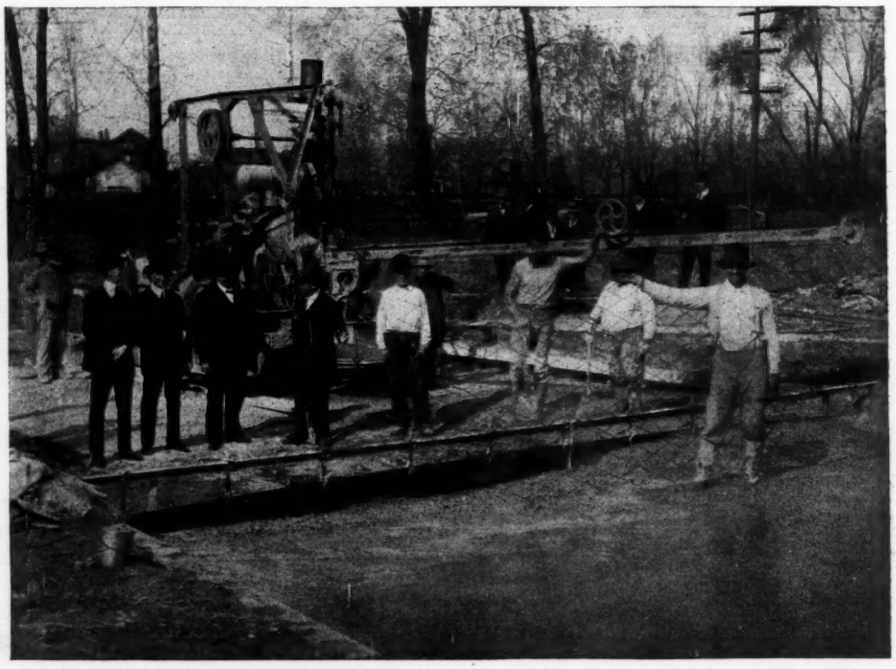
COMPARISON OF AVERAGE COST PER SQUARE YARD OF CONCRETE ROADS

State	1913	1915
Connecticut	$1.32	$1.13
Illinois	1.01	1.03
Indiana	1.23	.98
Iowa	1.11	1.19
Kansas	1.08	1.28
Maryland	1.21	1.08
Massachusetts	1.09	.95
Michigan	1.07	1.10
Missouri	$1.17	$1.09
New Jersey	1.12	1.23
New York	....	.98
Ohio	1.22	1.02
Pennsylvania	1.16	1.01
Texas	....	1.15
West Virginia	1.32	1.03
Wisconsin	1.06	1.02

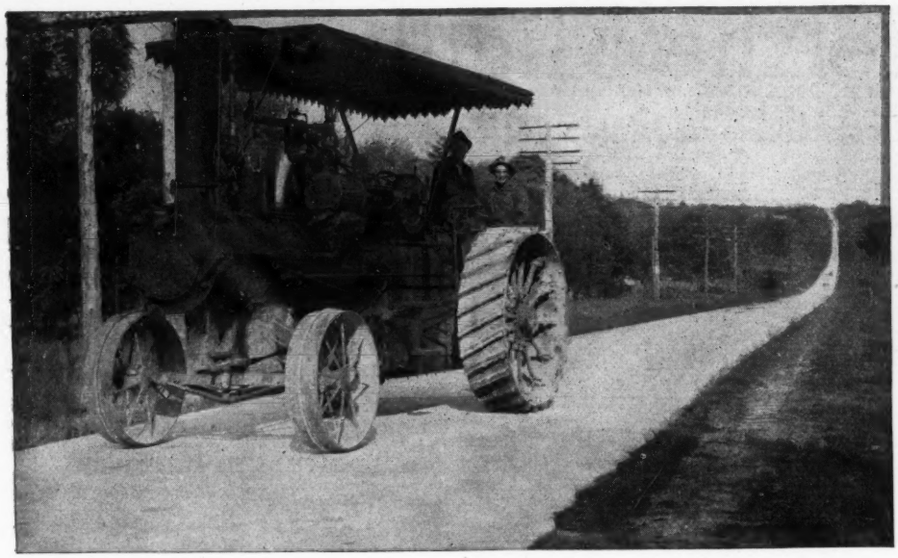
Figures based on 1915 maintenance work on concrete roads, having an average width of 16 ft. show the cost of such maintenance to be less than ½ cent per square yard per year. This is less than $47 per mile. Maintenance required on concrete roads is primarily dependent upon the quality and uniformity of the concrete used in their construction. Good construction means low maintenance. So great is the importance of proper construction that an increase in the life of the road and a great saving in maintenance cost will be secured if construction requirements are carefully and fully observed.

Some excerpts from the reports of highway commissions bring out the low maintenance cost of concrete. In Wayne county, Michigan, figures from the ninth annual report of the board of county road commissioners say: "With about 45 miles more of road to look after, part of it two years old and part of it a year older, we have spent a smaller sum by $5,174.04 over our maintenance costs of 1913-1914. This has been brought about by the replacement of a number of miles of bituminous macadam with the more durable and less expensively maintained concrete. The wisdom of building concrete roads, in our judgment, stands out conspicuously when the maintenance cost involved in keeping other types of road under our jurisdiction in usable condition is compared with the actual cost of maintaining concrete."

The Connecticut state highway commissioner in his report for 1914, says: "The greater part of our roads are waterbound macadam. As long as we maintain waterbound macadam we shall have an annual expense of $1000 to $1200 a mile for repairs. If another 500 miles of waterbound macadam is built, the repair expense alone will be tremendous. Under present-day



Some concrete road is reinforced with material such as is here shown. This is near Belleville, Ill.



It takes a real road to stand such traffic as this. This is a stretch of cement highway on the National road in Ohio

traffic, waterbound macadam is the most expensive road that can be built, if original cost and maintenance are both considered. The concrete pavement six inches thick, laid on worn out macadam costs $10,500 a mile, 18 ft. wide, not including grading or ditching. New waterbound macadam costs $7400 a mile exclusive of grading and ditching. Maintenance of macadam is $1000 to $1200 a mile per year, while the cost of upkeep of the concrete is not more than $50 a mile. At the end of five years the macadam, repairs included, has cost $12,400 a mile and you have nothing but a worn out macadam road and growing cost of upkeep. The concrete road, on the other hand, has cost $10,750, upkeep included, and is still in good condition.''

Cost of Maintenance

New York, according to the highway commissioners' report for 1915, had that year under maintenance, 192 miles of graveled roads on which the average expenditure, exclusive of reconstruction, was $577 per mile; 2298 miles of so-called waterbound macadam, $564 per mile, exclusive of reconstruction. With the resurfacing and reconstruction the average was brought up to $1,055 per mile. The maintenance, the commissioner says, is more expensive owing to the necessity of more frequent surface treatment and to the necessity for constant patching. In the same year New York had under maintenance 2387 miles of bituminous macadam on which the maintenance cost was $488 per mile, and 84 miles of concrete on which the maintenance cost was $129 per mile.

Figures coming from Milwaukee show the maintenance cost of concrete roads in 1915 to have been $58 per mile, $23 of which was for maintenance of shoulders, etc., leaving the actual maintenance cost of the concrete only $35 per mile.

The Ohio state highway department says: ''The cost of maintaining concrete roads will vary inversely with the quality and uniformity of the concrete in the original construction. So great is the relation that the importance of properly constructed road in the first instance cannot be overestimated. The best available data seem to indicate, as a conservative estimate for roads that have been down from one to five years, a maintenance cost of less than ½ cent per square yard—approximately $45 a mile—per year. Illinois figures show instances of maintenance cost being two mills to the square yard and in Maryland the total maintenance of concrete roads average about $100 to the mile.

From the best information available it would appear that concrete is the most inexpensive to maintain. This type of road is forging to the front rapidly. Engineers are improving each year in the constructive features and out of the greater mileage is coming a better understanding of what this newest of road materials is best adapted to withstand.

Constructional features of concrete road building have changed greatly the same as is true of brick road construction. In a concrete road it is especially desirable that it possess in as great a degree as possible, first, hardness in order to resist abrasive action of traffic; second, toughness in order to resist disintegrating action of horses' hoofs and other shocks; and, third, homogeneity in order that the surface may wear evenly. The character of the constituent materials and the proportions in which they are mixed both have a marked influence on the degree in which these qualities are possessed by concrete. In selecting the materials and determining the proportion in which they are to be mixed the prospect of securing the desired qualities in the resulting concrete should be given primary consideration.

No hard and fast rules can be laid down which would fit all cases in the selection of concrete materials, as availability is necessarily a very important factor. Satisfactory cement can usually be obtained. None should be used that does not meet all the requirement of highgrade Portland cement. The cost of importing the sand and coarse aggregate from any considerable distance is usually prohibitive and if there are any local materials which are or can be made suitable for aggregates they should be given first consideration. However, if the local materials are not such as to meet substantially the requirements, it would be doubtful economy to use them.

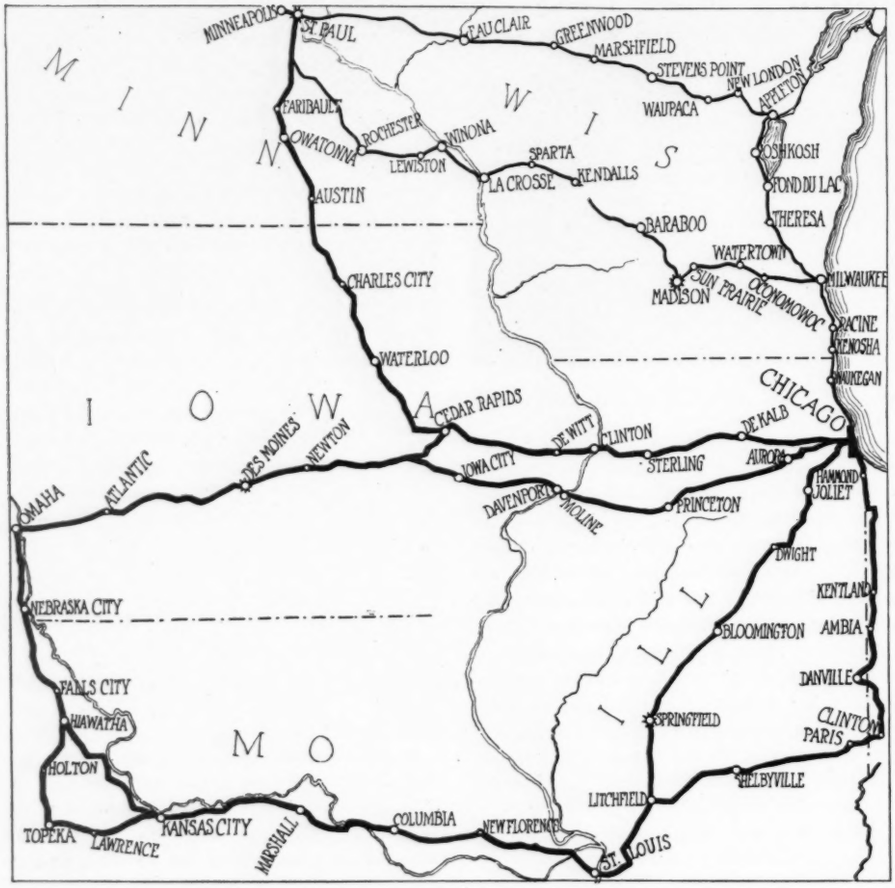
Free to Move

It is believed that it is important to leave the concrete surface free to move as it is shown by the appearance of cracks that it is necessary for it to do. Therefore, as soon as cracks are formed, and a sharp lookout should be kept for them, they should be cleaned out as thoroughly as possible and filled immediately with some plastic material, such as an asphalt pitch. This will prevent water seeping through the cracks and also offers considerable protection to the edges, especially if the crevice is flushed with a slight excess of the pitch.

Expansion joints protected by armor plates used in construction of cement road in Alley county section of Lincoln highway near Fort Wayne, Ind.

Chicago to the Middle West

Best Roads in Major Cities



Map of roads leading from Chicago to major middle-western cities

THIS week MOTOR AGE gives the best roads to middle-western cities. There are other ways of reaching the cities mentioned, but the routes given are looked upon as the best by those who are closely associated with touring conditions. There are two options to St. Louis from Chicago, the more direct being somewhat less desirable than the longer one. The direct route is by way of Joliet, Dwight, Chenoa, Springfield, Litchfield, Edwardsville and East St. Louis, while the longer route is by way of Hammond, Ind., Dyer, Morocco, Kentland and Ambia to Danville, Ill., thence south to Clinton, Ind., and then west through Paris, Mattoon, Shelbyville and Nokomis, joining the other route at Litchfield. The major portion of the direct route is dirt and not good in wet weather, while the other road through Indiana is all stone and considerably better across Illinois from Paris than the direct route.

Going west from St. Louis to Kansas City one should follow the National Old Trails route through St. Charles, Mineola, Columbia, Boonville, Marshall, Lexington and Independence to Kansas City. Most of this road is good, but there are stretches that are bad in wet weather. They should be avoided then.

From Chicago to Omaha there also are two options part of the way. One can leave Chicago and pass through Aurora, Mendota, Princeton, Genesseo, Davenport, West Liberty and Iowa City to Belleplaine, or follow the Lincoln highway west from Chicago through St. Charles, Rochelle, Dixon, Sterling, Clinton, Iowa, DeWitt, Mechanicsville and Cedar Rapids to Belleplaine, where the two options join and from there on pass through Grinnell, Colfax, Des Moines, Adair, Atlantic and Council Bluffs to Omaha. The more northern route from Chicago to Belleplaine is somewhat better than the southern route, but practically all of the route is over dirt roads and this season has not been conducive to the making of good dirt roads. It has been too wet for them to settle as they might if the weather had been better. The writer was told last spring that Iowa roads were all about alike. If the weather is good you can follow any of the roads with about the same success and if it is wet you have an equal amount of disagreeable traveling.

Tourists can link these two routes out of Chicago to the Missouri river and make a circle tour if they choose. The road from Omaha to Kansas City goes south through Nebraska City, Hiawatha, Kan., and Topeka, thence east into Kansas City. This is the best route to follow between these two points and is hard practically all of the way.

Answers to Inquiries

Chicago-Bloomington, Ill.

CHICAGO—Editor MOTOR AGE—Outline the best route from here to Bloomington, Ill. —Louis A. Schuler.

From Chicago drive to Blue Island, Mokena, New Lenox, Joliet, Elwood, Wilmington, Braidwood, Braceville, Dwight, Odell, Pontiac, Chenoa, Lexington, Towanda, Normal to Bloomington.

Vol. 5 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Chicago-Kansas City, Mo.

Chicago—Editor MOTOR AGE—Give route from Chicago to Omaha, St. Joe, Mo., Leavenworth, Kansas City, St. Louis and back to Chicago.—D. D. Goldstein.

From Chicago go to Maywood, Lombard, North Glen Ellyn, West Chicago, Geneva, DeKalb, Creston, Rochelle, Ashton, Dixon, Sterling, Galt, Lyndon, Erie, Hillsdale, Watertown, E. Moline, Moline, Davenport, Iowa, Durant, Wilton Junction, Moscow, Atalissa, West Liberty, Iowa City, Coralville, Oxford, South Amana, Marengo, Victor, Brooklyn, Grinnell, Kellogg, Newton, Colfax, Des Moines, Van Meter, Stuart, Adair, Anita, Atlantic, Oakland, Council Bluffs, Omaha, Fort Crook, La Platte, Plattsmouth, Nebraska City, Auburn, Falls City, Hiawatha, Kan., Highland, Fanning, Troy, Blair, Wathena, Elwood, St. Joseph, Mo., Russville, Atchison, Kan., Lowemont, Leavenworth, Kansas City, Mo., Independence, Levasy, Wellington, Lexington, Waverly, Grand Pass, Marshall, Arrow Rock, Boonville, ferry across Missouri river, New Franklin, Rocheport, Columbia, Fulton, Warrenton, Wright City, Wentzville, Dardenne, St. Charles, Junction, St. Louis, East St. Louis, Ill., Collinsville, Maryville, Edwardsville, Staunton, Mount Olive, Litchfield, Springfield, Williamsville, Elkhart, Lincoln, Bloomington, Normal, Towanda, Lexington, Chenoa, Pontiac, Odell, Dwight, Braceville, Braidwood, Wilmington, Elwood, Joliet, New Lennox, Mokena, Blue Island to Chicago.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Shreveport, La.-Jackson, Tenn.

Shreveport, La.—Editor MOTOR AGE—What is the best route from here to Milan, Tenn., via Little Rock, Ark., Memphis and Jackson, Tenn.?—A. P. Garchner.

From Shreveport go to Minden, Athens, Arcadia, Simsboro, Ruston, Choudrant, Calhoun, Monroe, Bastrop, Oak Ridge, ferry across Lake LaForche, Girard, Rayville, Holly Ridge, Delhi, ferry, Waverly, Quebec, Tallulah, Lake Providence, Millikin, Readland, Ark.,

Eudora, Chicot, Lake Village, Dermott, McGehee, Tillar, Walnut Lake, Dumas, Grady, Tamo, Moscow, Noble Lake Station, Pine Bluff, Redfield, Woodson, Wrightsville, Sweet Home, Little Rock, Argenta, Galloway, Hazen. Inquire at Hazen for directions over new road via DeValls Bluffs. Unless directed otherwise, continue to Roe, Clarendon, Brinkley, Wheatley, Goodwin, Forrest City, Caldwell, Colt, Wynn, Levesque, Parkin, Smithdale, Crawfordsville, Benson, Memphis, Tenn., Overton Park, Raleigh, Bartlett, Ellendale, Arlington, Gallaway, Braden, Mason, Stanton, Brownsville, Harvey to Jackson. At Jackson inquire as to the best roads to Milan.

Volumes 7 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for this trip. As most of the roads along this route vary from fair to bad, even in dry weather, you will find impassable stretches in wet weather and we would suggest that you inquire along the way as to road conditions.

Belton, Mont.-Yellowstone-New York

Kalispell, Mont.—Editor MOTOR AGE—Outline best route from Belton, Mont., to Yellowstone Park, Niagara, Ottawa, Canada to New York. Is it necessary to make a cash deposit entering Canada?—J. Arthur Lamb.

Outlined briefly, this route would go through Missoula, Hamilton, Dillon, Yellowstone Station, through Yellowstone Park and out via Cody. From Cody continue to Basin, Casper, Thermopolis, Douglas, Cheyenne, Bigspring, North Platte, Grand Island, Omaha, Marshalltown, Cedar Rapids, Clinton, Chicago, South Bend, Toledo, Cleveland, Erie, to Buffalo.

Volumes 7, 5 and 4 of the Automobile Blue Books contain complete running directions for this part of the trip.

Buffalo, N. Y.-Ottawa, Can.

From Buffalo drive to Niagara Falls, where a stop should be made at the U. S. Custom House for a permit, which allows the motorist to tour in the province of Ontario for twenty-one days without additional license. For a period longer than this an Ontario license must be obtained, costing from $6 to $25, according to the horsepower of the car. Cross the International Bridge, toll 25c, and proceed to Niagara Falls, Ont., St. Davids, Homer, St. Catherines, Jordan, Vineland, Beamsville, Grimsby, Winona, Fruitland, Bartonville, Hamilton, Aldershot, Burlington, Port Nelson, Bronte, Oakville, Port Credit, New Toronto, Toronto, Pickering, Whitby, Oshawa, Bowmanville, Port Hope, Cobourg, Colborne, Brighton, Trenton, Belleville, Shannonville, Marysville, Napanee, Cataraquia, Kingston, Gananoque, Lyn, Brockville, Prescott, Spencerville, Kemptville, Ridge Mills, Greeley, to Ottawa.

Vol. 1 of the Automobile Blue Books contains complete running directions for the above trip.

Ottawa-Montreal-New York

From Ottawa drive to Orleans, Cumberland, Rockland, Clarence, Wendover, Plantagenet, Alfred, L'Original, Hawkesbury, Little Rideau, Point Fortune, Carillon ferry, Carillon, P. W. St. Andrews East, St. Placide, St. Benoit, St. Eustace, St. Martin, Borde a Plouffe, St. Laurent, Montreal, Laprairie, Douglas Corners, Napierville, Lacolle. You may here have your car registered, procuring permit for entry into the United States, or obtain this permit at Rouses Point, N. Y., the next stop. Then continue to Coopersville, Chazy, West Chazy, Beekmantown, Plattsburg, Ausable Chasm, Keeseville, Clintonville, Ausable Forks, Jay, Upper Jay, Keene, Elizabethtown, Ruba Mills, Schroon River, Schroon Lake, Pottersville, Chestertown, Warrensburg, Lake George, Luzerne, Corinth, Saratoga Springs, Ballston Spa, Burnt Hills, Scotia, Schenectady, Albany, Rensselaer, East Greenbush, Valatie, Kinderhook, Stuyvesant Falls, Stockport, Hudson, Livingston, Blue Stores, Clermont, Nevis, Upper Red Hook, Rhinebeck, Staatsburg, Hyde Park, Poughkeepsie, Wappingers Falls, Fishkill Village, Peekskill, Croton, Harmon, Ossining, Tarrytown, Dobbs Ferry, Hastings-on-Hudson, Yonkers to New York.

Vol. 1 of the Automobile Blue Books contains complete running directions on this trip.

Chicago-Detroit

Chicago—Editor MOTOR AGE—Advise me which is the best route to Detroit.—J. B. Galloway.

The best and most direct route is the following: Chicago to South Chicago, East Chicago, Calumet, Gary, Aetna Station, Miller, East Gary, Porter, Michigan City, New Carlisle, South Bend, Elkhart, Middlebury, Shipshewana, Howe, Brighton, Orland, Ind., Kinderhook, Mich., Coldwater, Quincy, Allen, Jonesville, Moscow, Somerset Center, Somerset, Cambridge Corners, Clinton, Saline, Ypsilanti, Denton, Canton, Wayne, Dearborn, to Detroit.

Vol. 4 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Roanoke, Va.-Washington, D. C.

Roanoke, Va.—Editor MOTOR AGE—I have found the best route from Roanoke to Washington, via Natural Bridge, Staunton, Winchester, Harpers Ferry and Frederick, Md. The route is somewhat longer than others, but has better roads.—E. L. Kellogg.

Vinita, Okla.-Kansas City, Mo.

Oswego, Kan.—Editor MOTOR AGE—The following is an excellent route from Vinita, Okla., to Kansas City, Mo.: From Vinita to Blue Jacket, Welch, Chetopa, Kansas, Oswego, Parsons, Thayer, Chanute, Humboldt, Iola, Colony, Welda, Garnett, Ottawa, Olathe, Lenexa, Overland Park to Kansas City, Mo. —Edmund S. Carpenter.

Portable Wireless Telephone for Motor Cars

A LOS ANGELES inventor has just perfected a portable wireless telephone for use with motor cars. The apparatus is contained in the box and case seen on the running board of the gasoline car in the illustration. This contains both the sending and receiving apparatus to which the headpiece and transmitter are connected. This is so light and simple that it can be connected to any vehicle or car in a few minutes.

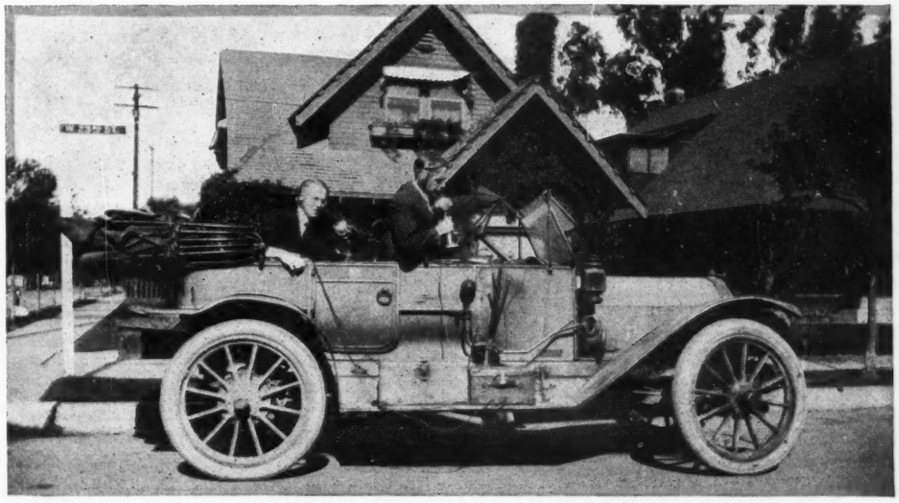
With this device communication may be had with another machine either moving or standing still, or with a central station.

The uses to which this remarkable invention may be put are many and varied and the expense is so small that it will soon be as common on cars as the wireless is at present on steamships.

By means of this apparatus the terrors of crossing deserts and similar stretches of country will be entirely eliminated, as the driver of a car equipped with this wireless can be in constant touch with other drivers or stations from where help could be dispatched.

This device could also be used in forest patrol work and help summoned instantly in case of forest fire. Physicians with their car equipped with this could be in constant touch with their office while making calls.

The inventor of this wireless gets his power from batteries and uses 50 volts where other systems use from 25,000 to 100,000 volts. He employs low frequency while all other systems employ high frequency. Instead of employing high towers for aerials this inventor strings wires from the front to the rear seat. The apparatus also is built for use in electric cars. The apparatus in this case is placed in boxes finished in a style to match the interior of the electric.



Wireless telpehone outfit fitted to a motor car. This portable unit is the invention of a Los Angeles man

Designing Farm Tractors

The Best Engine—Present and Future

This is the second of a series of articles dealing with the problems to be overcome in producing the vast quantity of tractors essential for increasing the world's food supply. The first article pointed out that a big market awaits a good tractor, that the engine is the principal unit and that it is not possible to set a definite price limit for a popular machine—Editor

THE tractor's most important part is its engine and, while it is easy to make a tractor motor which will do well according to our present lights, whether present best performances will be regarded as good in ten years' time is very doubtful. The tractor engines now in use are developed either from the motor car engine or from the stationary type of slow-speed gas engine, but it is easy to overlook the fact that the service demanded of a tractor motor is many times harder than either of the above-mentioned power units has to suffer.

For severity of service combustion engines may be classified as follows in order, the first being the hardest, the last the easiest:

Aviation engines in planes or dirigibles.
Tractor engines.
Heavy-oil marine engines.
Light-oil marine engines.
Motor car engines.
Stationary gas and oil engines.

Second Hardest to Build

Thus the motor car motor is given the easiest existence of all but one of these six divisions. These degrees of hardness of work to be done do not altogether represent difficulty of manufacture in inverse ratio, because there are compensations. For instance, the light-oil marine engine can be made to withstand long hours at full power by an increase in weight, and the same is true to some extent of tractor motors. Still figure it how you will, the tractor engine remains the second hardest to build if we are seeking efficiency and continued durability.

Since nearly all running is done at full power on both aviation and tractor engines, the principal difference between them is that of weight per horsepower. In other terms, this means that the tractor engine can have a low mean effective pressure, while the aircraft engine must have a high one, and that durability can be sought by size in one case, whereas it can only be obtained from high-tensile material in the other.

At first sight, this looks as though the tractor engine was a far easier proposition, but there is another factor, perhaps the most important of all, which in a sense makes the tractor engine the hardest of all to build successfully. This is that of all the engines classified the tractor powerplant is likely to get the least attention, while it operates under absolutely the worst conditions. An aircraft motor gets constant skilled attention and may be designed for experts, the engineer knows that the mechanic will at least understand it and be able to keep it in tune. The aircraft engine does not work in clouds of dust, it is not bumped and shaken, it can be sure of ample clean oil. Lastly, but far from least, it gets good, clean, light fuel.

The Engine

The ideal tractor engine should operate forever, at full power, on low-grade heavy fuel, with no attention, obviously an unobtainable ideal but one we shall always have to strive for.

Again to classify, the main problems of tractor engine design appear to be as follows:

Reliability without skilled attention.

Capacity to use heavy fuel.

The fulfillment of the first condition is rendered vastly harder by the presence of the second.

It is rather a sweeping statement, and will no doubt be challenged, but it is really true that the only entirely successful heavy-fuel engines in existence are those in which the cylinders are large enough to permit the fuel to be metered and injected. Further, none of these engines have been able to do well in any service without skilled handling, not necessarily highly skilled but much more skilled than the tractor engine is going to get. By heavy fuel is meant anything as low in vaporizing quality as commercial kerosene. Actually when we have cut out everything that goes into the lower three-quarters of the distillation curve of present-day gasoline, it does not seem to make much difference for a good distance farther. In other words, it is much harder to change from gasoline to kerosene than from kerosene to fuel oil.

Mechanical Reliability

However, let us first take the things which make for mechanical reliability without complications. First comes low unit pressures, which means large bearings and large parts so that the stresses throughout are low. Here the limitation is the forces due to reciprocation and centrifugal action. An engine is not made more reliable by being merely increased in size beyond a certain point, and we have yet to find just where that point occurs.

Next comes workmanship. Taking a bearing as an example, its life depends upon its unit loading to a great extent, but to an even greater upon its original fitting and its lubrication. No crankpin is perfectly round, there is always some error, but the nearer we get to perfection the better the condition for the bearing. So with cylinders and pistons, the smoother they are at the start the longer will they stay smooth. It is rather hard to get rid of the idea that the big engine with a very low power per cubic inch need not be made so accurately as the motor car motor, yet this is absolutely the wrong way to look at it. The better the finish on its wearing parts the longer will any machine run without trouble, so for shafts and bearings the tractor engine deserves at least as good workmanship as an aviation engine. There are not a dozen passenger car engines made today that would stand continued running at three-quarter power for an aggregate of several months, yet this is just about what the tractor engine gets.

Now, to consider the complicating effect of heavy fuel; the worst action it has upon reliability is the cutting of lubricating oil. This is not a trouble confined to heavy-oil engines, it occurs to a considerable extent with motor car motors; as soon as we have to deal with a vapor instead of a dry gas, action upon the oil will begin. With the tractor engine the case is worse because of the larger amount of fuel burned in a given time and because of the desire to reduce the light fractions in the fuel to a minimum.

Heavy Fuels Practicable

There seems to be an idea, somewhat prevalent just now, that engines modeled upon the stationary type are better able to handle heavy fuel than motor car engines. There is really nothing to support this, because the conditions are just the same for both. There is just one way in which a few stationary type engines have scored over the other, and this is that they are not always fitted with circulatory lubrication systems. Assume a lubrication scheme where each drop of oil is only used once, and is then thrown away; then the heavy fuel cannot do much damage to the mechanical reliability of the engine, but the oil consumption becomes a serious item or else all parts are starved of oil and their reliability impaired thereby.

It is a fundamental fact that a dry gas cannot be made from kerosene which will not become wet again on the slightest provocation, such as a trifing change in speed or load. Some inventors are approaching a metering system which will adjust the quantities of fuel, air heat, and perhaps water too, so delicately that all will respond automatically to speed and load changes.

This is the ideal apparatus for attaching to a four-stroke cycle engine designed to operate on gas, as are all engines with carbureters or vaporizers.

Two Things Needed

The other type of engine is that in which fuel is injected and burned in an excess of air. The best known is the Diesel; the most satisfactory in small sizes, the hot-bulb engine, commonly misnamed the semi-Diesel. Here the fundamental difficulty is that of proportioning the quantities of fuel injected to the speed and load, and no engine of this sort has yet been built commercially that would work on a tractor without moderately skillful handling.

Thus we have two things to work for in obtaining the heavy-fuel tractor motor: Either the perfect vaporizer which will deliver a gas that can be handled as a gas in the engine, or a super-Diesel or super-hot bulb which will not have the mechanical defects of this type, as at present made for stationary service in small sizes.

Just at present it appears that the probability is very strongly in favor of the perfection of the vaporizer preceding the perfection of the injection engine. The injection engine becomes harder to build with every decrease in the size of individual cylinders, and this is a serious handicap to tractor developments.

Again, to give an opinion that is not shared universally but is gaining ground, it is unthinkable that any engine with less than four cylinders can have a lasting place in tractor propulsion. If we are to have four cylinders they will need to be fairly small, much smaller than any which have been handled successfully as yet on the hot-bulb or Diesel principles.

Let it not be forgotten that the market for small stationary engines to run at constant speed and almost constant load, on heavy fuels, is much larger than the supply. The perfect engine of the hot-bulb type would be bought just as eagerly for stationary work as for any other, but the world is still waiting.

The Kerosene Illusion

Among the tractor producers a number claim to use kerosene, but one notices their demonstration machines operate mostly on gasoline. Particularly among the users of two-cylinder opposed engines one sees kerosene burning attachments that cannot possibly work without flooding the cylinders with raw fuel. Crude is altogether too mild a word to describe them. Once warmed up, a conventional passenger car will run on kerosene without carbureter alteration, after a fashion, and it is in about the same fashion that a big percentage of the nominally kerosene-burning tractors run. In a number of the layouts almost every known law for kerosene vaporizing is disregarded. Something that can just be "got by with" is not going to encourage the farmer to place a repeat order. It is better policy at the present to insist on the use of gasoline or gasoline and kerosene mixed than to pretend to do things on raw kerosene that cannot really be done.

A well-known engineer once said that one of the difficulties in tractor-engine making was that there "wasn't an eighth of an inch of coast in a tractor," meaning that if the engine missed a few explosions it stopped instantly. Similarly there isn't a long period of life for the tractor maker who depends upon exaggeration to sell his goods. You can fool a man a lot about the results he gets from his motor car, a little about what he gets from a truck, but there is no fooling the farmer after he has put his tractor to work.

Alcohol a Possibility

There is another possibility, the alcohol tractor. The opinions of experts as to the practicability of alcohol production on a large scale are diverse, but there is a fairly general agreement on the broad idea that alcohol can be produced from waste vegetable matter, and that if we can find the way to get enough raw material at one spot to keep a big still running we can have cheap commercial fuel. Alcohol, if it does come into use widely, will probably do so slowly. In certain parts of the world, notably the tropics, it can be made more cheaply than elsewhere and in such places we shall see the growth of demand for alcohol-burning engines for all purposes. Alcohol carburetes fairly easily, is a good, clean fuel, in fact, but it is of only half the thermal value of mineral oil. To burn it efficiently we need high compression, far higher than any gasoline engine, and even then to get the same power we have to burn approximately double the quantity. France has for many years tried to encourage the use of alcohol and trials held by the French government showed that the burning of alcohol in engines of the conventional motor car type, but of higher compression, was perfectly easy.

A thought suggests itself here which is that it should be worth the while of some tractor-engine builders to ascertain the best compression and to discover any other special fittings required for alcohol usage. There is reason to believe that any engine, almost, with detachable cylinder heads, could be constructed so that all the change necessary for alcohol burning would be a new head, just as a new head with lower compression is to be supplied for Ford cars which are converted to burn kerosene.

Still, the whole question of industrial alcohol is in the hands of political economists; it is quite out of the province of the engineer, and it appears certain that heavy oil will be a cheaper and better fuel to use for a long time to come, if we can only discover how to overcome its inherent defects.

There is no reason for despair on this fuel question. It took a great concentration of effort to produce the gasoline motor and develop it to the present state of comparative efficiency. Nothing like the same amount of effort has been put into any other type of combustion engine, even the large gas engine has not had so much work done on it.

Fuel Problem Will Be Solved

Look back fifteen years. In the motor car field then there were about a dozen makers of motor car engines which would drive a car 10,000 miles without a thorough overhaul; all the other engines were more or less constantly troublesome. And the dozen good engines were nothing by comparison with what we have to-day.

The motor car industry has now been at work on the heavy-fuel engine for about a year, seriously that is, and it is reasonable to expect another five or more to elapse before much is accomplished.

Perhaps it may be thought that what the motor industry does or does not do is of smaller importance than the work of the older gas-engine men, but this is not so. The motor industry knows more about small combustion engines than the gas-engine builders know about large units. It has built many times as many engines, it is much more closely appreciative of the operating conditions for engines on any kind of vehicle, it has fewer fixed ideas, it carries out experimental work more rapidly than any other industry in the world. Most important of all, perhaps, its new ideas are tried out by the tens of thousands instead of by the tens without the thousands. It has a prodigious army of users testing things for it and rendering the results of their tests speedily.

Four Cylinders Are Best

To go back a little it may be explained why the four-cylinder engine seems better than any with a lesser number. A two-cylinder engine can be almost as well balanced but it cannot have the same even flow of power, the torque variations must be much greater. For the same power the pistons must be larger, and as the impulsive pressures will be larger the individual parts must be stronger and heavier. It is argued that there will be more two-cylinder tractors built this year than ever before, but the fact that Ford's output is so huge does not mean that all the features of the Ford cars are examples of the best engineering. Output from one factory is no index whatever of engineering quality. Some of the most efficient and in every way best motor cars are made by small firms. In the tractor field just now it is the small firms which are evolving the ideas, the large ones that are copying at a later date; at least, this is true to a great extent. It is true still in the motor industry, it is true in other industries. The best possible thing for the development of any machine is to have a large number of competitive firms engaged in its production.

Descending to the simplest illustration for support of the contention that four is a minimum number of cylinders for a tractor, let anyone who doubts it ride on a half dozen different tractors, some with two and some with four cylinders. Then let him say on which he thinks nuts will shake loose quickest, on which he thinks the gears will last longest. There is only one opinion.

Just a small reservation. There is going to be a need for small tractors with first cost as the prime consideration, as stated in the last article of this series. In small sizes the two-cylinder can be built cheaper and it may have a permanent place on this account. The smaller the machine the less the disadvantage of a two-cylinder engine; the cheaper a machine the more drawbacks must we be prepared to endure.

False Saving

Efficiency is a much misused word, but there is only one meaning for it in tractor estimation. The most efficient tractor is the one which will do the most work for the least money for the longest time, and with the fewest breakdowns. It does not take long for a tractor to burn up $100 worth of fuel, even with an engine of high fuel efficiency, so $100 more or less on the first cost of a medium-size machine is of little account. What mischief can be done by trying to save this on first cost may be exemplified by an actual experience.

A certain stock engine appearing on paper to be most excellently designed for tractor work was tried out experimentally by a tractor maker building his own motor. It was considerably cheaper than the latter engine but the design looked good. On the block the stock motor showed up well, in service it did well for a time. Then one thing after another happened. A connecting-rod broke, owing to defective material, the camshaft bearings gave out, apparently due to an original disalignment of the center bearing with the other two; after taking down the oil pan there was trouble in getting a tight joint on reassembling because the finish of the faces was rough and too much reliance was placed upon a soft-cork gasket. There were other troubles, all due to poor material or to rough workmanship.

Tractor Engines Best Built

To-day the tractor engines which are giving the best service are the best-built engines and the best-built engines are mostly being made along the lines of the best truck motors, only a little heavier: About halfway between the engines of a truck and a cruising type power boat for weight, and nearer the former for speed. The speed tendency is upward, because with higher speed comes more even torque and smoother operation. Just as the truck engine developed from that of the passenger car and shouldered out other forms of heavy-duty engine, so does the tractor engine appear to be developing from the truck motor.

Few Argentine Tractors

Shortage of Mechanics and High-Priced Fuel Delay Sales in Camp

Plentiful Horses and Scarce Money Make Market Slow

BUENOS AIRES, June 15—The sale of farm tractors in Argentina is very low, considering the fact that no more ideal country could be wanted for the use of farm tractors. In the camp, or country, the land is level as far as the eye can see. There is not a stone to break the monotony, and no more appropriate field for the use of the farm tractor could be desired. Notwithstanding this favorable condition, the tractor is not in good repute in Argentina today. This is not due to any defect in the tractors but largely to a series of conditions. The situation might be summed up as follows:

The first tractors brought to Argentina were of the very large type, and many of them were sold in different sections to the large estancerios, who were enjoying great prosperity at that time and had plenty of money. With these people these large tractors were not a success, not owing to the mechanical construction or faulty design, but because those handling them had a very vague knowledge of the engines. It was really a shortage of mechanics. To this must be added the high price of fuels. The shortage of mechanics was really the greatest obstacle to the successful use of the tractor in Argentina. The memory of those days still lives through many parts of the country, and it will be some time before the owners of them will forget that they were money-losing propositions. These owners abandoned them for all forms of farm work with the exception of threshing purposes. In this field they were not a success, because the straw-burning engine proved much cheaper for threshing purposes.

Although this refers to pioneer times, the handicap then imposed on the tractor field still exists. The old prejudice gradually is losing ground, thanks to the American cheap and medium-priced cars, which 80 per cent are selling through the camp, or country. These cars are training mechanics, they are doing a wonderful educational work in this regard and naturally are paving the way for the small gasoline tractor. Today whatever tractors are being sold in Argentina are of the small type, but even these sales practically have ceased since the war. Argentina has certain existing crude oil supplies, but they have not been developed satisfactorily so that the fuel price is still very high. Previous to the war most of the gasoline was shipped in from England, but since July, 1914, a great supply not only of gasoline and kerosene, but oil for fuel purposes has been coming from the United States and Mexico. The price of gasoline is very high, ranging from 50 to 70 cents a gallon. The price of kerosene is very little less, because freight on kerosene is as high as on gasoline. Because of this there is little advantage with the tractor-burning kerosene.

To better appreciate the present atmosphere with regard to a tractor in Argentine, it should be borne in mind that this country suffered a money crisis dating from the start of the war in 1914. Added to this money crisis was the further calamity of poor crops. Many farmers found themselves with restricted credits, gasoline and kerosene rose in price, and crops dwindled. Horses were plentiful and still are. During the last year instead of conditions improving they have practically gone from bad to worse. Not only is the wheat crop poorer, but the corn crop as well.

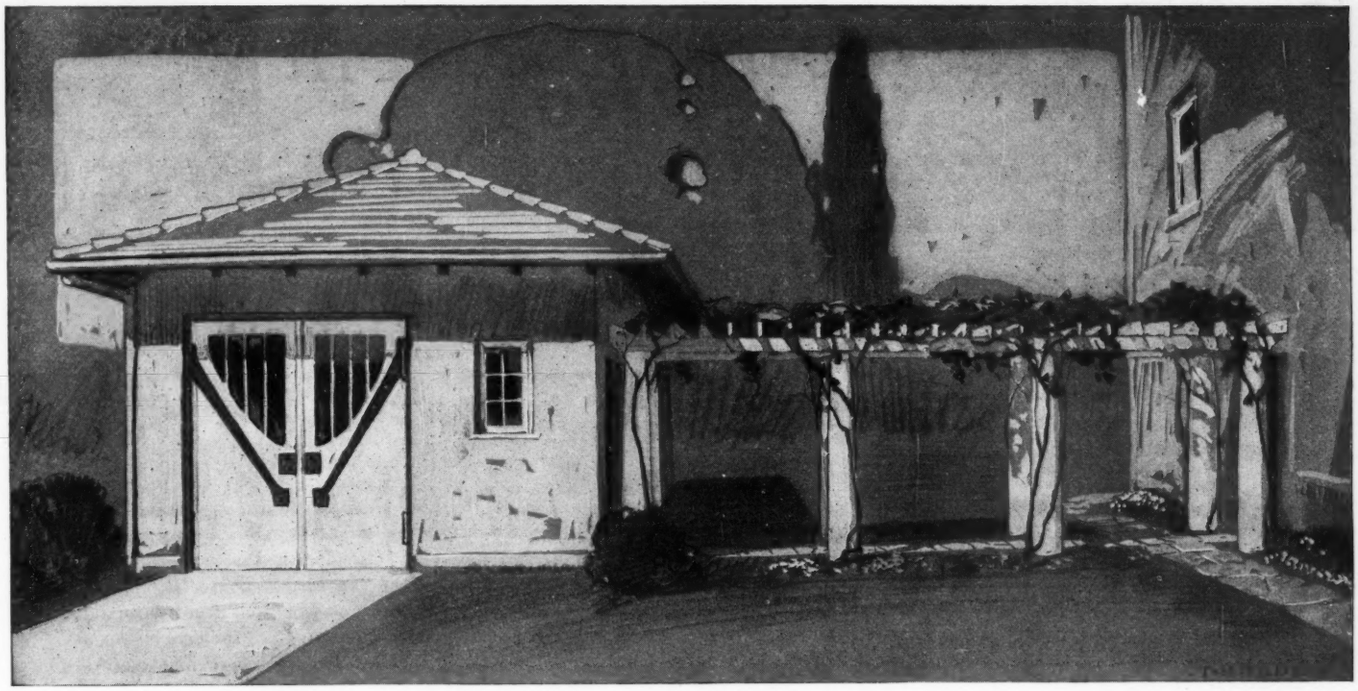
Notwithstanding these unfavorable farm conditions, the farmers are watching the tractor development, but it is impossible to expect much business for some years to come. There are many horses in the country, and they are too cheap and too easy to keep, as they require no feeding the year round. Farmers do not feed their work horses in Argentina as they do in the United States. They generally have plenty of grass and enough horses, so they are able to work one outfit of horses one day and another outfit the next day. Many large farmers cultivate during the forenoon with one group of horses and use another group in the afternoon. This eliminates every necessity of feeding oats, hay or other fodder.

Farms Need More People

The whole farm system in Argentina unquestionably will change in years to come. What rural Argentina needs is more population. More land must be placed under cultivation. So long as the war is going on the population has been dwindling in the camp rather than increasing. The farming population is largely Italian, and the war has drawn heavily on them.

The agricultural situation in Argentina is not permanently bad. This country is one that recuperates readily and responds quickly to good crops. A few years of good crops and freedom from locusts will mean the putting of more land into cultivation. A greater surplus of money in the country unquestionably will result in a more businesslike development of the oil properties of the country, which should reduce the price of fuel. At present it is possible to hire land plowed for less than the cost of gasoline to do the plowing with tractors.

Unquestionably the increased sale of motor cars throughout the country will make it easier to sell the small tractor. The fact that Ford has a large assembly plant in this city, which was started last fall, and which is still over 500 cars behind, shows that the buying capacity of the country still exists. So long as small cars sell there is hope for the small farm trac-

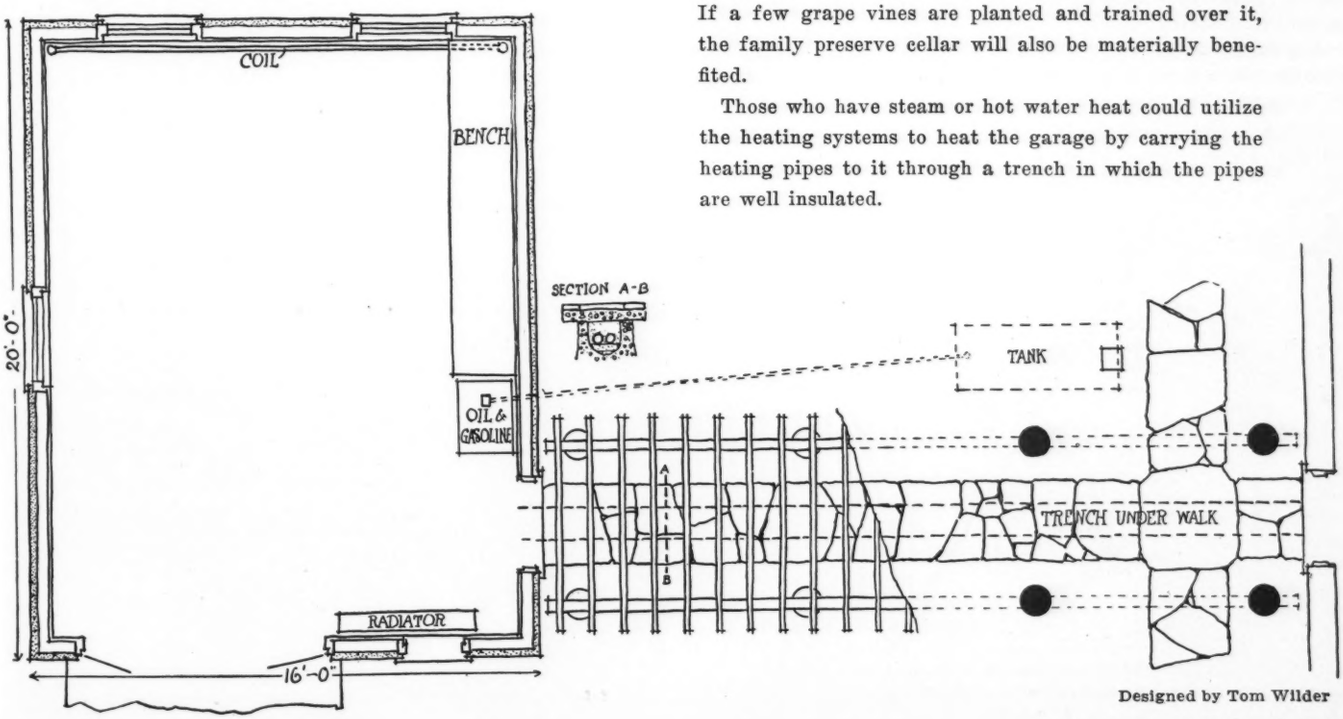


The Owner's Garage

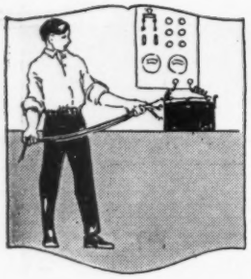
WHILE it is generally conceded that a garage built integrally with a house is the best possible proposition economically, otherwise there are very few conditions that will allow such a disposal of the problem where the house is already built.

The accompanying illustrations show a garage connected to one of the now popular square stucco houses by a pergola. This pergola extends from the side door of the house—the one on the basement stair landing level with the ground—to the side door of the garage and unites the two buildings in a very pleasing manner. If a few grape vines are planted and trained over it, the family preserve cellar will also be materially benefited.

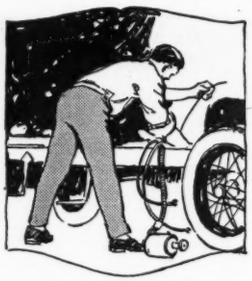
Those who have steam or hot water heat could utilize the heating systems to heat the garage by carrying the heating pipes to it through a trench in which the pipes are well insulated.



Designed by Tom Wilder



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the fiftieth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered.

Part L—Electrical Equipment

WHEN a current of electricity is produced in a wire there is a certain amount of electrical work done in causing the electricity to flow against the resistance offered by the wire, just as a certain amount of work is done in causing a current of water in a pipe or overcoming the resistance offered by the pipe to the free flow of the water. In each of the above cases the work done is converted into heat. The amount of heat produced in the case of the water is in the great majority of cases quite small, and for this reason it is not given very serious consideration. The heat generated in the wire, when there is a current in the wire, depends on the resistance offered by the wire and also on the value of the current in the wire.

A good example of the fact that there is heat generated in a wire in which there is a current of electricity is found in all the commercial electrical heating devices and in the incandescent lamp. The heat generated depends on the value of the current, and if it were possible to measure the amount of heat generated in a given time, in a certain wire with a known value of current in the wire, it would be possible to use the same wire in measuring a current by accurately measuring the heat generated and from this computing the value of the current. This method of measuring a current is not commercially possible, and a more practical application of the heating effect is used.

The principal of an electrical instrument operating on the heating effect of a current is shown diagrammatically in Fig. 282. A wire, AB, of comparatively high resistance, low temperature coefficient and non-oxidizable metal, has one end attached to the plate C, then passed around a pulley, P, that is secured to a shaft, S, and its free end is brought back and mechanically, though not electrically, attached to the plate C. The spring F keeps the wire under tension, it being attached to the plate C, which is so guided that it can move in a direction at right angles to the shaft S. An arm, G, also is attached to the shaft S, being counterweighted at the upper end by the weight W and split open, or bifurcated, at the lower end. A fine silk thread, T, has one end attached to one of the arms at the lower end of G, then passed around a small pulley, H, which is mounted on a shaft that carries a pointer, I,

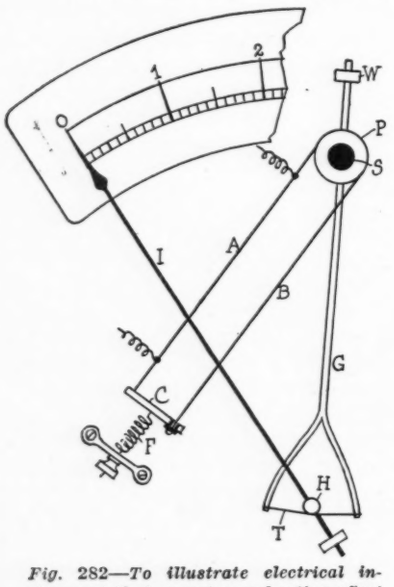


Fig. 282—To illustrate electrical instrument that operates on heating effect of current

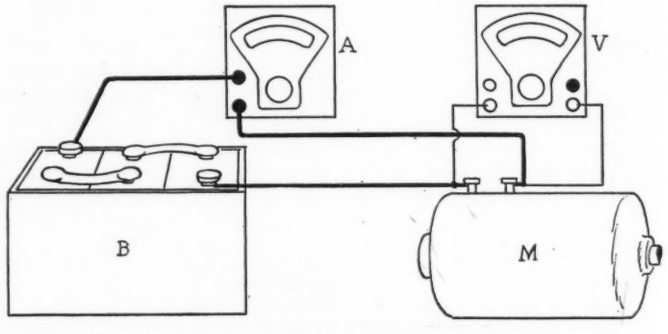


Fig. 283—Connections of ammeter shunt in parallel with coil of ammeter

and finally has its other end attached to the second arm of G. The material composing the arms of G is springy and serves to keep the silk fiber in tension.

The current to be measured passes through the wire A, entering and leaving through two twisted conductors, as shown in the figure. When a current is passed through A it is heated and expanded, which usually results in the tension in A being less than that in B. The tensions originally were the same, and equilibrium can be restored only by the pulley P rotating in a clockwise direction. This rotation of the pulley P causes the lower end of the arm G to move toward the left. The silk thread that passes around the pulley H causes it to rotate in a clockwise direction, and as a result the needle, or pointer, I, is deflected toward the right, being rigidly attached to the pulley H. Changes in the temperature of the entire instrument affect both the wires A and B alike, and there is, as a result of this equal change in their lengths, no movement of the pointer I. An instrument of this kind always deflects in the same direction regardless of the direction of the current, as the heating effect of a current is independent of the direction of the current through the part of the circuit being heated. An instrument of this kind may be used in measuring either direct or alternating current.

Ammeter Shunts

In certain types of ammeters, especially the D'Arsonval type, it is practically impossible to carry the total current to be measured through the coil of the instrument. To prevent the necessity of doing this, use is made of what is called an ammeter shunt. This shunt is nothing more or less than a low resistance, arranged to be connected in parallel with the coil of the instrument. In other words, the coil of the instrument and the shunt are in parallel and the total current divides inversely as the resistance of the two paths. This shunt may be connected permanently and inclosed in the instrument case or it may be outside the instrument proper and connected to the coil of the instrument by flexible leads. When the outside method of connecting the shunt and coil in parallel is used, shunts of different resistances may be used with the same coil and in this way the range of the current capacity of the instrument, increased. When shunts are used the reading of the ammeter scale will be correct for one particular shunt, but additional markings must be provided, or the reading multiplied by a constant, for the other shunts. The current ranges for the different shunts are usually multiples of ten.

The resistance of the coil in the different types of ammeters should always be as low as possible in order that the voltage required to overcome the resistance of the ammeter be as low as possible. The coil when in parallel with the shunt gives a lower total resistance than the coil alone. The proper connection of an ammeter with an inclosed shunt is shown at A in Fig. 283. The ammeter indicates the current taken by the motor M and the current in the voltmeter, which is very small and usually may be neglected without any appreciable error.

Principle of the Voltmeter

The voltmeter is an instrument for measuring the electrical pressure between two points to which the terminals of the voltmeter are connected. The fundamental principle upon which the voltmeter operates is exactly the same as that of the ammeter, the difference being in the resistance of the instrument. The deflection of the pointer on an ammeter depends on the current through the windings of the instrument, and this current will vary in value as the electrical pressure acting on the instrument varies in value, provided the resistance of the instrument is constant. Thus, if an electrical pressure of 1 volt produces sufficient current in the winding of the instrument to cause the pointer to move a certain distance over the scale, then 100 volts will cause the pointer to move the same distance if the resistance of the instrument is increased to 100 times its original value. If the resistance be increased to ten times its original value, then ten times the electrical pressure will be required to produce a certain deflection, etc. With a certain resistance in circuit, the deflection of the pointer will vary as the pressure between the terminals of the instrument, because this variation in pressure causes the current through the instrument to vary in value.

An instrument similar to the one shown in Fig. 278 may be changed from an ammeter to a voltmeter by changing the number of wires in the coil. Thus, if a current of 10 amp. is required to produce a certain deflection of the pointer when the instrument is used as an ammeter, the same deflection may be produced by sending a much smaller current through a larger number of wires when it is used as a voltmeter. The same thing is true of the instruments shown in Figs. 278 and 280.

The proper connections of a voltmeter are shown at V in Fig. 283.

Combined Ammeters and Voltmeters

Quite often an ammeter and a voltmeter are combined in a single instrument, which usually is spoken of as a duplex instrument. Such an instrument is shown in Fig. 284. In the duplex instrument the ammeter and the voltmeter, so far as their operation is concerned, are independent of each other.

In some cases the same coil is used either as an ammeter or as a voltmeter. The internal connections of an instrument of this kind are shown diagrammatically in Fig. 285. The terminal marked plus, +, is used both for the ammeter and the voltmeter. When connections are made to the plus terminal and the terminal marked 30 A, the instrument will read a maximum current of 30 amps. Changing from the 30 A terminal to the 3 A terminal, the maximum current will be 3 amp. When connections are made to the plus and 15 V terminals, a maximum pressure of 15 volts may be had, provided the key is depressed.

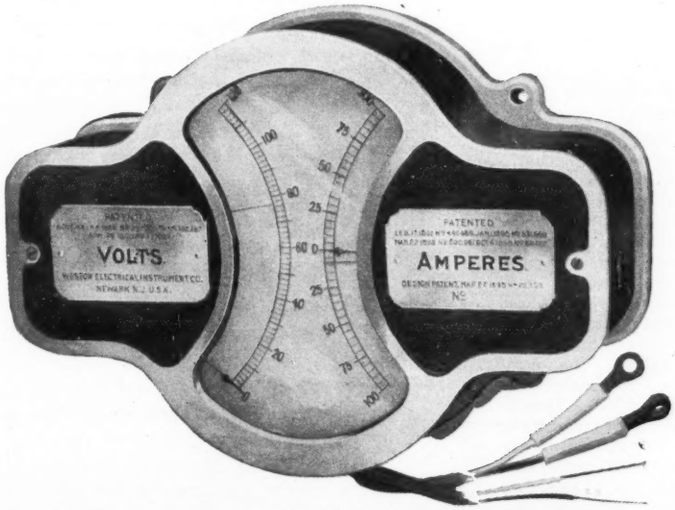


Fig. 284—Weston duplex instrument for electric motor cars, a combined ammeter and voltmeter

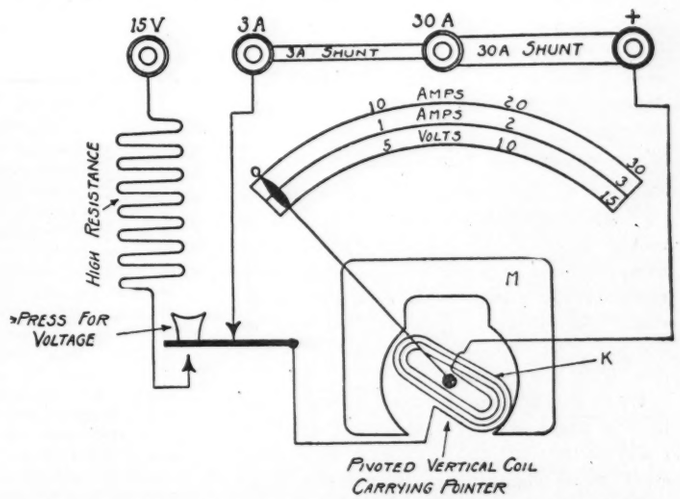


Fig. 285—Diagram of combined ammeter and voltmeter in which the same coil is used as either instrument

From the Woman's Viewpoint

Practical demonstration of adjustable holder for suitcases, canteen and other objects on running board of car

Motoring Made Easy

ONE of the most important questions in motoring is: How shall I carry baggage and provisions? This has been answered partly by the many motor restaurants, special trunks and suitcases that have been constructed, but there are still those who use the everyday suitcase or lunch box and then rack their brains to find a way to fasten the box or case to the car in such a way that its contents will be protected from abnormal bumps and still be out of the way of passengers.

Here is shown a novel contrivance which is adjustable to carry any object the width or length of running board. It consists of two parts, which are separated. These parts, or ends, are adjustable in width and may be placed on the running board to accommodate any length. In this way a suitcase or canteen may be carried with equal ease. The device is made by Leslie E. Moore, Los Angeles, Cal.

Going Camping?

THIS is the time of the year when the camping parties begin. It is not necessary to take a cross-country trip to go camping, and so we find the camper from town on the 3-mile creek or 5-mile river, where the fishing is good and the man of the party can get back to town on Saturday, if it is necessary.

Word comes from Western tourists that it is a little early yet to tackle the dirt roads of that region. However, those who start across country usually are the hardened tourists and know something before hand about camping and camp fires, etc. The short-trip camper, more often, does not know much about camp fires and cooking in the open.

Well, take it from those who have been there, there is many a slip between romance and practice when it comes to trying to cook over an open fire. Unless there is some veteran camper along, the best thing to do is to take a small gasoline or kerosene stove. The camping size stove of this sort can be carried in a tin water bucket, together with odds and ends.

The motorist who uses the small camping stove seems unable to say enough in praise of it. Usually, especially if the motorist is a woman, there has been some sad experience with an open fire. For instance, many tales of woe are of odors of leaves and smoke, in the food. It takes a veteran to make a perfect fire, one that does not forget it is to cook, and not to smoke, food.

Cornmeal Biscuits

1 cup yellow cornmeal
2 teaspoons salt
2 cups peanut cream

Put the meal into a shallow pan and heat in the oven until it is a delicate brown, stirring frequently. Make the nut cream by mixing peanut butter with cold water and heating. It should be the consistency of thick cream. While the nut cream is hot stir in the cornmeal, which should also be hot. Beat thoroughly. The mixture should be of such consistency that it can be dropped from a spoon. Bake in small cakes on a greased pan.

If preferred these biscuits may be made with cream or with butter in place of peanut cream, and chopped raisins may be added, 1 cup being the allowance for the quantities given above.

Food Mobilization

THE President's letter to Herbert C. Hoover:

12 *June*, 1917.

My dear Mr. Hoover: It seems to me that the inauguration of that portion of the plan for food administration which contemplates a national mobilization of the great voluntary forces of the country which are ready to work toward saving food and eliminating waste admits of no further delay.

The approaching harvesting, the immediate necessity for wise use and savtng, not only in food but in all other expenditures, the many undirected and overlapping efforts being made toward this end, all press for national direction and inspiration. While it would in many ways be desirable to wait complete legislation establishing the food administration, it appears to me that so far as voluntary effort can be assembled we should not wait any longer, and therefore I would be very glad if you would proceed in these directions at once.

The women of the Nation are already earnestly seeking to do their part in this our greatest struggle for the maintenance of our national ideals, and in no direction can they so greatly assist as by enlisting in the service of the food administration and cheerfully accepting its direction and advice. By so doing they will increase the surplus of food available for our own army and for the export to the allies. To provide adequate supplies for the coming year is of absolutely vital importance to the conduct of the war, and without a very conscientious elimination of waste and very strict economy in our food consumption we cannot hope to fulfill this primary duty.

I trust, therefore, that the women of the country will not only respond to your appeal and accept the pledge to the food administration which you are proposing, but that all men also who are engaged in the personal distribution of foods will co-operate with the same earnestness and in the same spirit. I give you full authority to undertake any steps necessary for the proper organization and stimulation of their efforts.

Cordially and sincerely yours,
WOODROW WILSON.

Mr. Herbert C. Hoover, Washington, D. C.

Your Food Bit

The conservation department of the Illinois division, woman's committee of the Council of National Defense, has proposed the following menus as long in calories and short in wheat products:

BREAKFAST

Oatmeal and dates, cream and sugar
Toast with oleomargarine
Coffee—milk for children

LUNCHEON

Souffle
Corn bread
String beans
Baked or sliced bananas

DINNER

Baked rice and cheese
Carrots
Bread and oleomargarine
Tapioca custard

The Motor Car Repair Shop

Making Socket Wrenches

THE making of socket wrenches is comparatively easy for any motorist disposed at all to tinkering about his garage. All that is necessary is to secure several pieces of pipe of different diameter to fit various sizes of nuts. As an example, if it is desired to make a wrench for a nut which measures ¾ in. diagonally, obviously a pipe of ¾ in. inside diameter must be used.

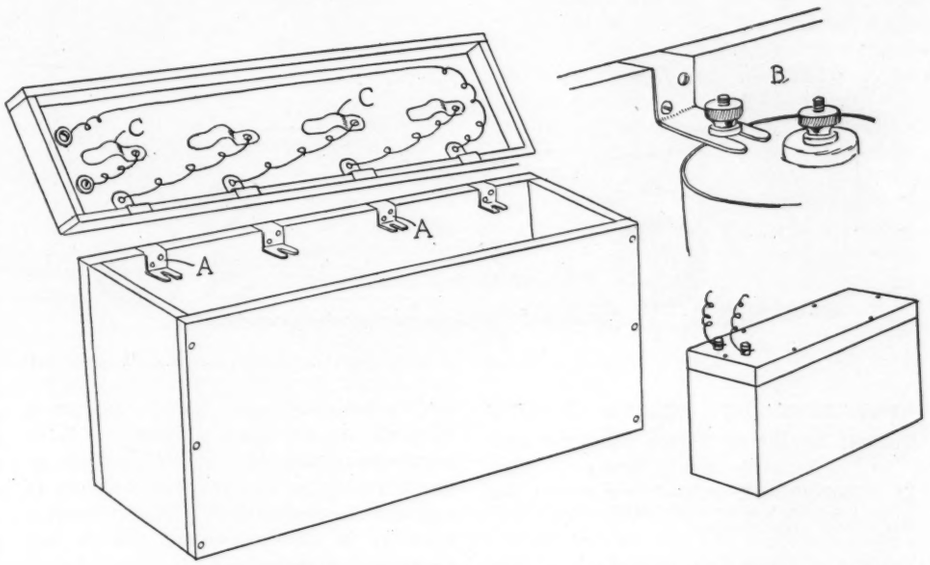
Having obtained the various sizes of pipe, you can proceed to form them into the desired shape. First insert the nut into the end of the pipe as shown at A. Two or more nuts used in this way will give a longer depth to the mouth of the wrench. The next step is to flatten the sides of the pipe as shown at B. This can best be done in a vise. Two sides will, of course, be flattened at the same time and by turning the pipe a quarter turn, the remaining two faces can be forced into the desired shape. A little hammering on an anvil might also help to smooth up the job. By tapping the sides of the pipe the nuts will drop out, or they can be poked out with a screw driver or iron rod. If circumstances permit, the mouth of the wrench should be case-hardened, which will add materially to the wearing qualities.

After the pipe has been cut to the desired length a ¼ in. hole is drilled in the opposite end and a short length of iron rod used as a handle.

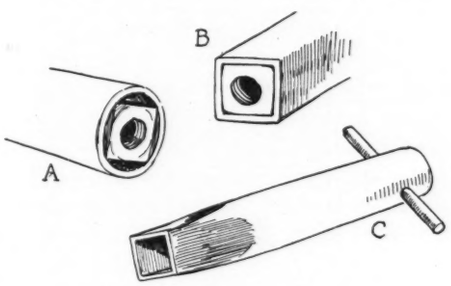
To Protect Dry Cells

One reason why dry cells sometimes run down quicker than they should is because they are not properly protected in the car. The modern systems of starting and lighting as well as the ignition systems do not employ dry cells in their makeup very extensively but on the older types of systems, where the use of batteries is necessary, it is to the car-owners' advantage to see that his batteries are not subject to vibration and exposed to moisture. A wooden box fitted with a cover, in which permanent connections have been made, can be constructed easily from materials usually found about the garage. Such a box is shown in the accompanying illustration.

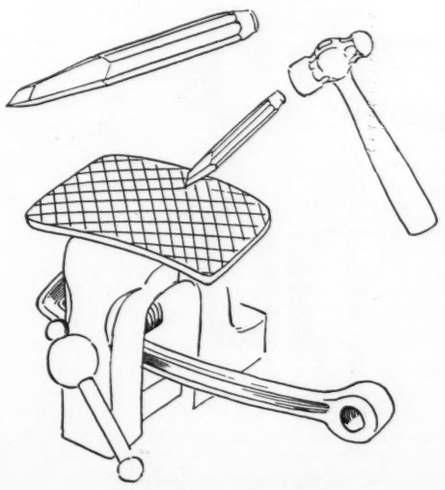
The sides, end, bottom and cover are made of hardwood ⅜ in. thick. The box is made in any length to take as many batteries as desired. Screws are used to fasten it together and when this has been done the inside is covered with melted paraffin to keep out moisture. The cover is made so that it will come flush with the sides of the box and the connections placed as shown. The lugs A are made of sheet copper bent as indicated, so that when a cell is placed in the box its negative or zinc terminal will slip into the slot cut in A. When the terminal nut is screwed in place, the battery will be held firm, as at B. Four other pieces of copper are fastened to the cover so that when the latter is in place these pieces will bear down squarely on the pieces A. On the inside of the cover and in the center are fastened four copper pieces C, which are bent to such a shape that they will bear down upon the carbons or positive terminals of the cells. The pieces C should be bent sufficient so that when the cover is put on, some pressure will be required to bring the latter down in place. All of the copper pieces can be fastened with small screws.



Home-made box to protect dry cells from vibration and moisture



Steps in making socket wrenches



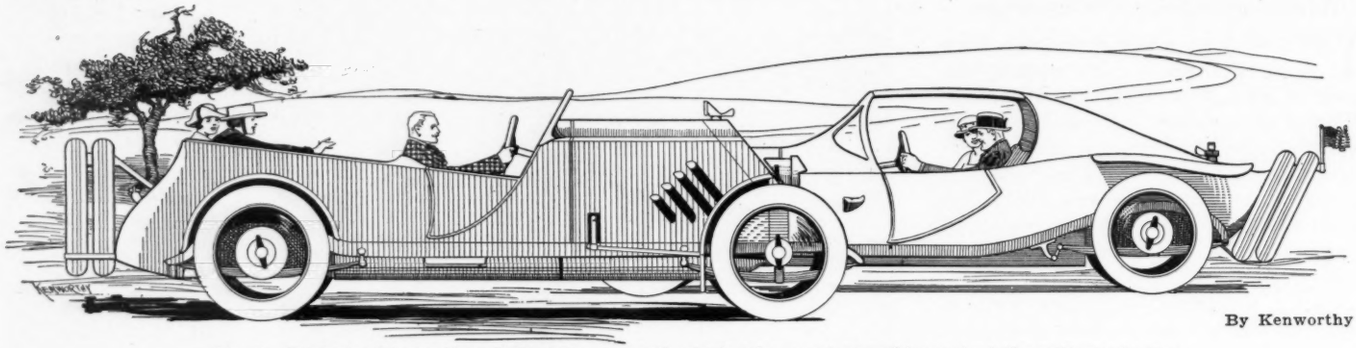
To cure worn foot pedals

Two back-connected binding posts are placed in the cover as shown, to which the wires are run from the copper lugs. In the illustration the cells are shown wired in series, which is the form generally used. All that is necessary in installing cells is to slip them in place in the box and screw down the zinc posts. When the cover is in place all connections will be made and cannot jar loose, especially if they are soldered. The cover is held in place by long screws, after which melted paraffin is applied around the joint.

Roughing Foot Lever Pads

After the car has been used for a considerable length of time, it is very likely that the surfaces of the pedals will have become worn quite smooth. Their use may, under such condition, involve a certain amount of risk, in that should sudden pressure be applied, the foot may slip off sideways. This state of condition can be easily remedied by removing the pedals from the car and roughing the surfaces by a series of punch marks. The pedal is clamped in a vice as shown and after covering the surface with chalk, a number of diagonal lines are drawn and at each intersection of the lines a punch mark is made with a diamond-nosed chisel and hammer.

The Readers' Clearing House



By Kenworthy

Fig. 1—Exclusive MOTOR AGE *body types for enthusiasts who want something out of the ordinary in cars*

OPERATION OF DIESEL ENGINE

General Layout of Valves and Fuel Ignition System Is Given

PEMBERVILLE, Ohio—Editor MOTOR AGE —Publish a sketch showing operation of the Diesel type of engine.

2—Can you give the approximate date for the publication of the Electrical Equipment series, in book form?—Blake Hobart.

Diesel engines operate on both the two and four-cycle principle. In the latter type, on the suction stroke, pure air is drawn into the cylinder and compressed to about 500 lbs. At the top of the compression stroke a charge of fuel, usually a cheap form of oil, is injected under pressure. The heat ignites it and this forces the piston down. On the exhaust stroke, the piston forces the burned gases out through the exhaust passage in the usual way. In the two-cycle type the down stroke of the piston is the working stroke in every revolution. When the piston reaches the bottom of its stroke, it uncovers an exhaust port at one side and an air port on the other. Air under pressure is sent through the cylinder, driving the burnt gases out and filling the cylinder. On the up-stroke this air is compressed.

The general layout of the valves and fuel injection system of the Diesel type of engine is shown in Fig. 2. The cylinder C has very little clearance between the top of the piston F and the bottom of the combustion chamber at the end of the compression stroke, at which moment the injection valve, operated by the level J, will be opened to permit the injection of a charge of fuel forced during about 20 deg. of the crank revolution from the supply pipe P, assisted by an atomizing charge of super-compressed air through the pipe D. The cage containing the injection valve is water-jacketed, water entering and leaving by pipes W. The operation of the air admission valve A and the exhaust valve E is mechanically controlled in the conventional manner. The movement of the injection valve is very slight, giving a narrow annular oil opening.

Surrounding the valve spindle is a series of brass washers perforated parallel to the spindle by many small holes. The oil is pumped into the space around the valve spindle near its middle and by capillary attraction finds its way between the washers and into the perforations. The air for fuel injection is admitted behind the oil and because of its high pressure, blows the oil into the cylinder when the valve opens. The amount of oil admitted is regulated by the governor, which controls the time of opening of a by-pass connecting the discharge and suction sides of the oil pump. At light loads the oil is pumped to the fuel valve for part only of the admission period. In this case air alone will enter past the valve for the remainder of the period.

2—No definite date has been set.

Distillate Not Harmful

Los Angeles, Cal.—Editor MOTOR AGE—I have installed a distillate burner of my own make which burns two quarts of water, generated into steam, to a gallon of distillate. It keeps the motor free from carbon and gives more power and mileage. Will it harm my engine any?—J. R. Stead.

We can see no reason why your engine should be damaged by using the above providing no water gets into the crankcase.

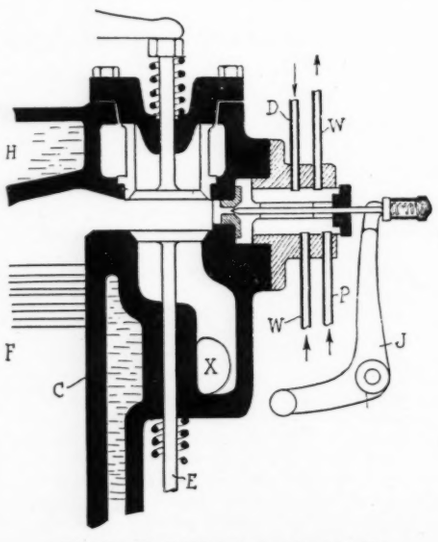


Fig. 2—Fuel injecting system of the Diesel engine

OPERATION OF FORD CAMSHAFT

Front Wheel Brakes Difficult to Apply to Motor Car

East Orange, N. J.—Editor MOTOR AGE—Give degrees of operation of Ford stock camshaft.

2—What is the simplest way of finding percentage of combustion chamber on a Ford? What percentage is the stock Ford combustion chamber?

3—How can I communicate with Harry Hartz?

4—Explain action of front wheel brakes on racing cars in turning a corner against rear wheel type.

5—In what sense do they lessen skidding and allow quicker turns to be made?—Roland C. Gifford.

1—The inlet valve opens $\frac{1}{8}$ in. of piston travel past the top center on the first stroke, or 12 deg and 40 sec., measured on the crankshaft throw. The same valve closes $\frac{1}{4}$ in. past the lower center, or 50 deg. and 48 sec. of crankshaft travel after bottom center. The exhaust valve will open when the piston has traveled to within $\frac{11}{32}$ in. of lower center on the third stroke. This measured on the crankshaft would be 37 deg. and 51 sec. Then exhaust valve will close on top center, the piston being $\frac{5}{16}$ in. above the cylinder casting.

2—There is no simple way of finding this, inasmuch as the combustion chambers are very irregular in shape and their volumes cannot be ascertained by ordinary mathematical calculations.

3—Address a letter to him in care of the Houk Wire Wheel Co., Los Angeles, Cal.

4-5—One form of front-wheel brake is shown in Fig. 7. The mechanism of this is mounted on an extension of the steering spindle and is of the expanded shoe type. The action is about as follows. When the bell-crank A is pushed against the steel pin B which is concentric with the Spindle body bolt, the cam C is rocked by means of a lever attached to it. This expands the brake shoes against the drums fastened to the front wheels. The arm D of the bell-crank is connected by means of rods and universal joints to a hand lever or foot pedal operated by the driver in the usual manner.

It is claimed that the application of brakes to the front wheels of a car will

lessen the skidding action, in that the braking action will be on the wheels in front, which point in the direction the car is traveling in.

One of the chief difficulties to contend with in the fitting of front wheel brakes, is that some flexible and positive braking connection has to be provided which will allow for the angularity of the wheels when turning a corner. This demands that one side of the operating mechanism must shorten while the other lengthens. Whatever the form of actuating mechanism used, it must apply the braking force equally on both wheels. In the case of the conventional rear wheel brakes, this is not a difficult problem, but the designer of front wheel brakes has many obstacles to overcome to make sure that each front wheel brake will be applied with equal force.

Reo Heats After Few Miles Run

Helena, Ark.—Editor MOTOR AGE—The engine of my Reo 1912 gets hot after a few miles run. The circulation is good and I have cleaned the radiator, but without results. What is the trouble?—Joe J. Papa.

Overheating of the engine may be caused by many things. Among these might be mentioned insufficient water supply in the radiator, incrustations or limestone deposits in the water jackets or tubes of the radiator, constricted openings in gaskets where connections are made between engine and radiator or mud may have become lodged in the fins of the radiator. Improperly bent blades of the fan, loose fan belt, tight fan bearing and improperly working water pump, if the car has one, will contribute towards overheating.

Too rich a mixture will cause an engine to get hot. Another important factor to check up on is the lubrication system, for an engine that is being starved of oil cannot be expected to run and cool properly. Sometimes on old cars the timer or spark lever control rods wear to such an extent that the spark is in the retarded position, whereas the driver thinks he is driving with the spark properly advanced.

One Cylinder Misses On Buick

Glidden, Iowa—Editor MOTOR AGE—The engine of my 31 Buick, 1913 model, has a very bad miss in the second cylinder. I had the car thoroughly overhauled last year, put in a Marvel carbureter, and leak-proof rings, and it was all right for 3 months. Have made numerous adjustments, and used high and low test gasoline, but it misses just the same. When running 10 or 15 m.p.h., it fires on all four cylinders, but when you press on the throttle for more speed it will begin to miss on the second cylinder and get worse. It does not seem to help by adjusting the carbureter; I have also had all carbon burned out.—William Slocum.

If the spark plug gaps are not too wide it would be best to first inspect the wire going to the missing cylinder. See that it makes perfect contact with the plug and with the magneto. Next inspect the distributor board of the magneto and see that there is no gummy deposit on segment No. 2. Also clean the distributor with a little gasoline, then put a few drops of oil on the board. If the board is clean and the wire leading to the plug making perfect contact and the gap in the plug correct, there is no reason why the cylinder should miss from this source. Sometimes at higher engine speeds, a wire which is otherwise making fairly good contact will jar loose from vibration, thus causing the cylinder to misfire. If your trouble was in the valves of this particular cylinder, the chances are it would manifest itself at all engine speeds, yet it may be well to go over the valve tappet adjustment. However, the symptoms in this case seem to point to improper functioning of the ignition.

Inquiries Received and Communications Answered

Blake Hobart.....Pemberville, Ohio
Joe J. Papa.....Helena, Ark.
Roland C. Gifford..East Orange, N. J.
J. R. Stead.....Los Angeles, Cal.
W. Slocum.....Glidden, Iowa
T. Clavadatscher.....Sauk City, Wis.
L. A. Dix.....Washington, D. C.
Lewis M. Gordon.....Ames, Iowa
A. B. C.....Abingdon, Ill.
Alfred B. Stratton.....Arlington, Kas.
R. L. Fleming.....Fort Worth, Tex.
Dean Allison.....Altoona, Pa.
S. F. HosHour.....Strasburg, Va.
A. W. Campbell.....Lexington, Ore.
L. A. Menard.....Globe, Ariz.
D. E. Guthrie.....Raymond, Ill.
J. J. Currie.....Monessen, Pa.
Bert Gyllin.....Chicago, Ill.
C. A. Starr.....New York, N. Y.
Morgan Sherwood.....Courtland, Ala.
Harold Ringold...Grand Rapids, Mich.
Lloyd Stevens.....Harrisburg, Ill.

ADVANTAGE OF SHORT MANIFOLD

Carbureter on E. M. F. Probably Not Adequate for Fuel

Sauk City, Wis.—Editor MOTOR AGE—We are overhauling a model Q Maxwell car and putting on a Stromberg carbureter. The intake manifold is 10 in. long. What would be the advantage of shortening the manifold?
2—What is the gear ratio of the E. M. F. 30 car
3—The car uses about 1 gal. of gas to 10 miles. Could you suggest anything to improve that?
4—We are using light grade oil in the E. M. F. car. Is that O. K.?
5—What should be the gasoline level in a K No. 1 Stromberg carbureter?
6—Is there any carbureter which will burn kerosene?—T. Clavadatscher.

1—The advantages of having a short manifold is that there is less chance for condensation of the vapors.

2—A little over 3½ to 1.

3—Ten miles to a gallon of fuel would indicate that the engine was in need of overhauling. Perhaps the pistons are worn to such an extent that it would be advisable to install new ones after having first rebored the cylinders. Also if the car is still equipped with the original carbureter, it may be that the latter is not adequate to cope with the present day gasoline. Installation of a modern type carbureter might help things materially. Make sure that the valves are in good shape and that the ignition system is functioning properly to insure complete combustion of the fuel. In a case of this kind it is always well to make sure that the vital parts of the engine are performing properly before any attempt is made to change the carbureter. Heating the intake manifold should give better mileage.

4—In view of the fact that the engine may be worn to quite an extent, it may be advisable to use a medium oil.

5—To ascertain this it is necessary to take off the top of the bowl and hold the latter in a vertical position, in a vise or by some other means. Fill the bowl with gasoline and if the level is correct, the levers actuating the float will be in such a position that they will not strike against the float bowl cover. To test this place a straight edge across the open bowl after filling.

6—There are several types of kerosene carbureters on the market. Practically all of them, however, provide some means whereby gasoline is used to start the engine to warm it, after which the kerosene is fed.

Wiring a 1915 Saxon Six

Peotone, Ill.—Editor MOTOR AGE—Publish a wiring diagram showing the windings of the generator and regulating device and cutout of the Gray & Davis lighting and starting system used on the 1915 Saxon Six, Model S.—A Reader.

This diagram is shown in Fig. 3.

Prefers Cheesecloth to Waste

Washington, D. C.—Editor MOTOR AGE—While in the aero station service I ground in rings on a spare cylinder, using fine emery and oil, and got a good fit. I ground in tungsten valves by the same method. A good way to test a tungsten valve is to put four pencil marks at four equally spaced points on the circumference of the valve and turn once around; if the pencil marks are no

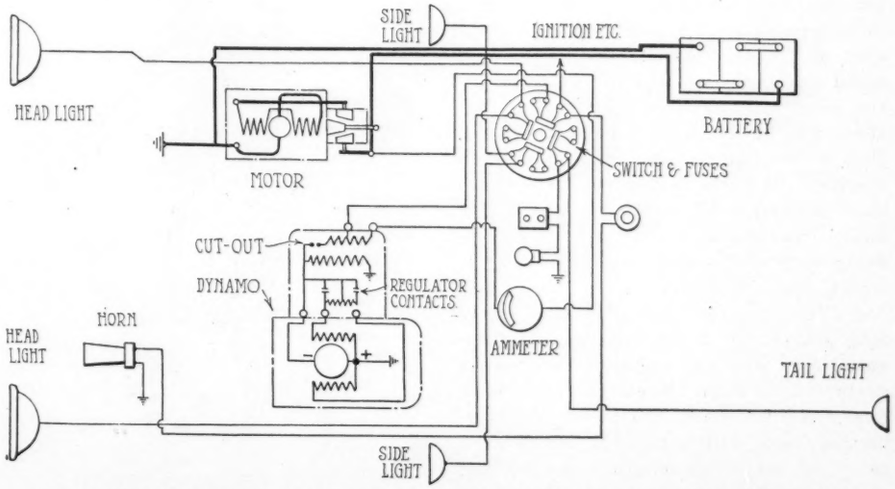


Fig. 3—Wiring of 1915 Saxon Six, showing windings of the generator and regulating device

Fig. 4—The hollow crankshaft used on the Gnome type of revolving engine. Only one crank is used

longer visible, the valve has been properly ground.

We used cheesecloth in camp to wipe off gasoline and emery from the valves, after which a thin coat of oil was put on the valve, and the latter replaced. Cheesecloth, in my opinion, is much better than waste. I put on wax polish with it, as it will not lint and you can wash it with gasoline if you wish to save it. It can be cut up in small pieces and neatly stowed in a smaller place than waste. It can be bought by the bolt, 15 yds. long and 12 in. wide, and costs less than waste.

My advice to cross country tourists is to have a pump installed on their car, carry an air gage, a spare tire or two and enough oil to carry them to the nearest station. I carried a spare tire but had to make a bracket at the rear end of the car. I carried a kit of tools, tire, gage, pump and tire repair outfit.—L. A. Dix.

CONVERTING FORD TO SPEED WORK

Solid Tires Not Practical on High Speed Racing Car

Ames, Iowa—Editor MOTOR AGE—I am cutting down my Ford into a racer. Would you advise lengthening the wheelbase for comfort and ease of handling? If so, how much?

2—Does any firm make longer drive shafts and other necessities for lengthening the wheelbase?

3—What is the objection in using solid tires for racing cars?

4—By using a larger pinion in the differential, is it possible to materially increase the speed of a Ford racer? What size pinion would you suggest?

5—Is there a device on the market which makes the exhaust of a Ford sound deeper?

6—Would you advise removing one or more leaves from Ford springs after being cut down for racing?—Lewis M. Gordon.

1—Better leave the wheelbase as it is. It is quite an undertaking to lengthen this and what little you might gain would be offset by the expenditure.

2—MOTOR AGE knows of none.

3—They are too heavy and the lack of resiliency causes undue vibration, followed generally by a loosening of parts in the car. Solid tires suffice for slow moving vehicles such as trucks, but will not do for high speed racing cars. Another objection to the use of solid tires for speed work is that there will be too much peripheral weight. This means that the car will not pick up quickly. One reason why wire wheels are used so extensively on racing cars is that heavy rims are done away with, thus confining more of the weight in the hub of the wheel, where it should be.

4—Yes, but you must also change the ring gear which is fastened to the differential case with cap screws, otherwise the gears will not mesh. Some Ford cars which have been converted into racers have performed very well with gear ratios of 3 to 1. A set of these gears can be had from the supply houses.

5—We know of no such device, but a suggested method of constructing an intensifier for the sound issuing from the exhaust of an engine was described in the May 10 issue of MOTOR AGE in the clearing house.

6—We do not think this would be necessary. It may be well, however, to graphite the leaves of the springs and then wrap them with heavy fish cord. This will give them an easy action, besides preserving the original number of leaves.

Dry Cells Replaced by Battery

Abingdon, Ill.—Editor MOTOR AGE—I have an Overland model 79, 1914, with Gray & Davis starting system, single wire lighting; dry cells for starting ignition, and low tension magneto for running. I wish to eliminate the dry cells for starting, using storage battery instead. How can this be arranged wthout burning out the coil or running down the storage battery? Publish diagram.—A. B. C.

It will be impossible for you to use the storage battery in place of the dry cells, by connecting the present battery leads to the terminals of the 6-volt battery.

Engine Hot and Will Not Start

Arlington, Kan.—Editor MOTOR AGE—My 1917 Ford will not start easy when the engine has run for half an hour. It has been run only 300 miles and never has been allowed to overheat. It has plenty of oil and water at all times, but refuses to start after being run half an hour. What is the trouble?—Alfred B. Stratton.

Undoubtedly the cause for your engine acting the way it does is due to the carbureter feeding entirely too much gasoline. When an engine is cold it will start easily on a rich mixture, but when hot, the mixture must be diluted with air to cause proper operation. When, for instance, you try to start the hot engine, it is feeding so much gasoline in proportion to the air that it chokes itself. If you cannot remedy the trouble by carbureter adjustment, it may be necessary to get a new needle valve and grind it in. This ought not, however, to be the case with a new car and it may be that the float in your carbureter gets stuck, causing too much gasoline to be fed.

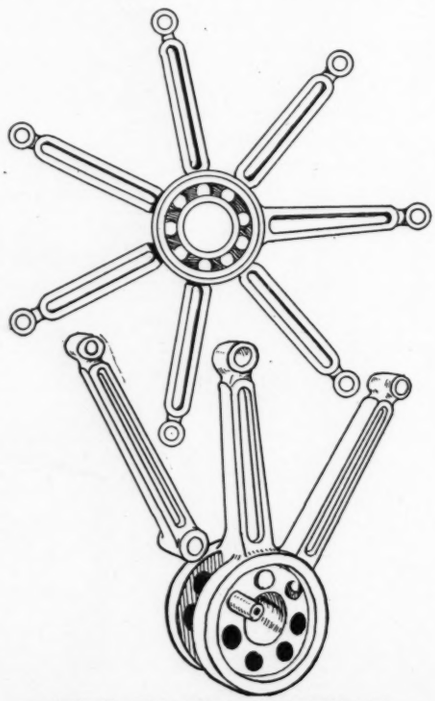


Fig. 5—Connecting rod assembly of Gnome rotary engine

OPERATION OF A ROTARY ENGINE

Rods Pistons and Cylinders Revolve as Unit

Fort Worth, Tex.—Editor MOTOR AGE—Publish an illustration and explain how the power is derived from a gasoline engine of the rotary type after it has been developed.

2—Why is it that this type of engine has never been used in motor car work?—R. L. Fleming.

In the rotary-cylinder engine the crankshaft is held stationary and the cylinders are mounted on a cylindrical crankcase which can revolve. The rods are fastened to the crankshaft pin by means of a bracket and bearing, as shown in Fig. 5. When an explosion occurs in such an engine the energy can do nothing else but force the piston down. This action turns the rod holder on the crankshaft, which causes the rods, pistons and hence the cylinder to revolve as a unit. The pistons and connecting rods turn, but since the rods are mounted on a crank and the latter is stationary, the pistons will take different positions in the cylinders owing to the location of the rods on the crank pin. This will be made clear by reference to Fig. 7, which shows a section of the Gnome seven-cylinder rotary engine. When an explosion occurs the cylinders and rods A, B, C, etc., all turn.

In the movement of the cylinder A from X to Y, the piston in the cylinder will travel downward, as shown. By the time cylinder A reaches the position now occupied by the cylinder E the piston will be almost at the bottom of its stroke. In other words, it is really the cylindrical rod holder shown in Fig. 5, which determines the position of the pistons. This is so because the holder assumes different positions on the crank.

The exhaust valves of these engines are in the cylinder head and the intake in the piston. The latter is balanced with a counterweight so that the momentum does not disturb the timing. The gas is taken in through the hollow crankshaft into the crankcase and from there is sucked into the cylinders through the pistons.

2—It has been done in the old Adams Farwell car.

Wants to Build Ford Racer

Altoona, Pa.—Editor MOTOR AGE—Publish a sketch showing a cheap way to build a Ford racer.

2—About what gage steel would be best suited for this purpose?—Dean Allison.

1—A suggestion for this is shown in Fig. 6. This design was submitted by a reader

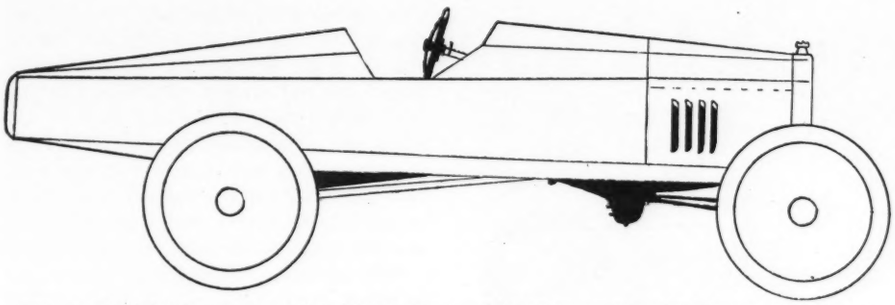


Fig. 6—Straight-line body to fit the Ford chassis designed by reader. The long tail contains the gasoline tank

and should not cost much to build, especially if you do the work yourself.

2—The writer has constructed several cars and found 22 gage leaded-steel the most satisfactory. This is the gage metal used by most makers of special bodies. It can be obtained in sheets 36 in. wide and 120 in. long.

TWO TIMELY MOTOR TOURING TIPS

On Preventing Loss of the Gasoline Tank Cap

Strasburg, Va.—Editor MOTOR AGE.—I recently had to pay $1.50 for a new gasoline tank cap because I forgot to screw on the old cap after purchasing gasoline. I know of others that did the same thing but adopted no means of preventing further losses. I solved the difficulty in the following way. I had a hardware man bore a small hole in the top of the new cap. I then inserted a small screw-eye into the hole and battered the screw end flush with the underside of the cap. I next tied one end of a good, strong rawhide thong in the inserted eye and the other end to a secure part of the machine. I did not use a light chain as it would have scratched the paint.

This little protection, costing 5 cents, has saved me $2 or $3 since fixing it, for twice since the first time, I have had garage men forget to screw the cap on. Once, after a 12-mile ride I found the cap dangling at the end of the thong.

Another time I had to take a trip over freshly tarred roads. I knew that the under sides of the fenders would become pasted with the soft tar; so I tried a new plan to prevent the adhering of the tar. I washed underneath the fenders to get rid of the dust and grit. Then I took some new cup grease and greased the fenders heavily. When I returned home I used a little gasoline on some waste and found that what tar did stick to the grease came off very much more readily than from the uncoated paint of the fender. I was careful to keep the gasoline from soaking into the paint and now about a month afterward, I cannot see any damage to the paint at all. These are little suggestions which may save some owners money.—S. F. Hoshour.

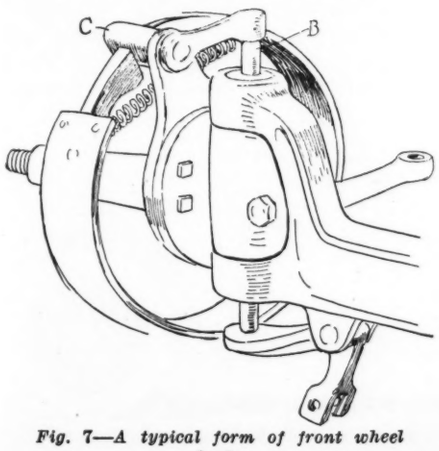


Fig. 7—A typical form of front wheel brake

Reader Has Body for Ford

Lexington, Ore.—Editor MOTOR AGE—I am inclosing a drawing of a "Bug" body for a Ford. It is modeled on the style of the latest car with straight lines. As you will note, the regular radiator and hood is used, the hood slightly changed to conform to the straight lines. The steering gear is dropped and special seats used. The top of the tail may be opened to gain access to the gasoline tank and tools. The wheels may be built up with sheet metal to appear like solid wheels or wire wheels may be attached.

1—What is the official speed record of the Hudson Super Six stock phaeton?

2—What is the dynometer horsepower of the Hudson Super Six engine?

3—Explain more fully than in the article on lighting and starting the third brush system used by the Delco system on the Hudson.—Arthur W. Campbell.

1—The official speed record of the Hudson stock chassis is 75.8 m.p.h. This was made in a 24-hr. race and represents the average speed. The car was driven by Ralph Mulford at Sheepshead Bay on May 2, 1916.

2—MOTOR AGE has no record of this.

3—This will be explained in a coming issue of MOTOR AGE.

Four-Stroke Cycle Correct

Globe, Ariz.—Editor MOTOR AGE—Which is the correct term to use in speaking of gas engines, "four-cycle" or "four-stroke cycle"?—L. A. Menard.

Four-stroke cycle is the correct term to use, but popularly engines of this type are spoken of simply as four-cycle engines.

No Cars so Equipped

Raymond, Ill.—Editor MOTOR AGE—What cars besides the Studebaker, and which sell at less than $1,200, have adjustable front seats?—D. E. Guthrie.

MOTOR AGE has no records to show that any other cars at less than the above price are so equipped.

Converting R. C. H. Into Speedster

Monessen, Pa.—Editor MOTOR AGE—Publish a sketch of a body for an R. C. H. tour-

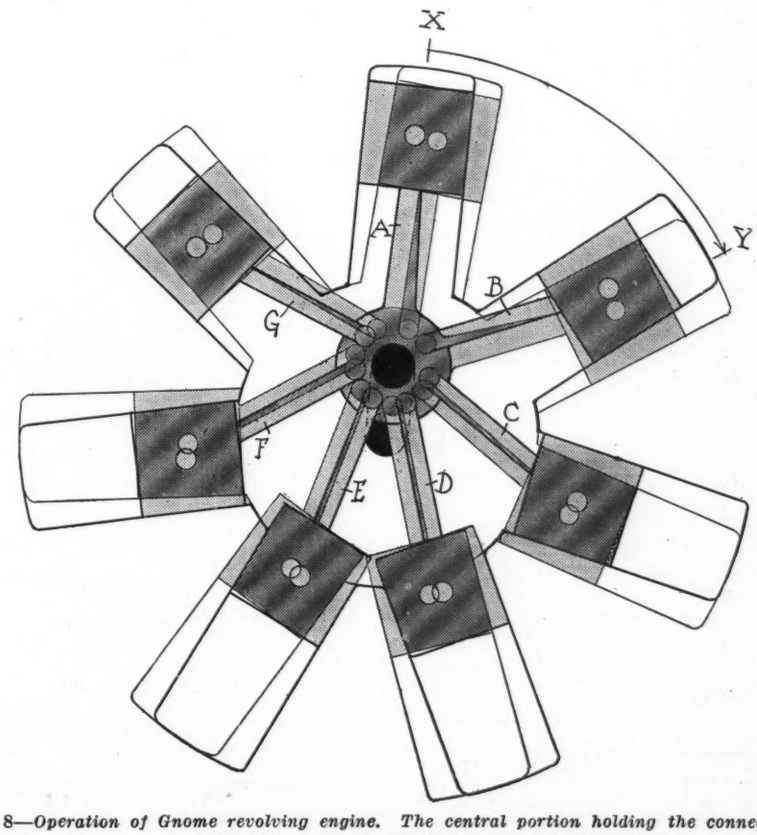


Fig. 8—Operation of Gnome revolving engine. The central portion holding the connecting rods revolves upon the stationary crankshaft

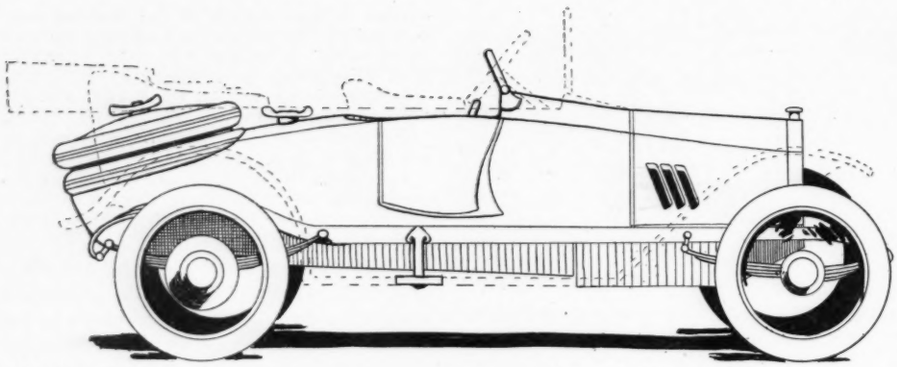


Fig. 9—How an R. C. H. touring car might be cut down into a formidable looking speedster

ing car 110 W. B., as I want to convert same into a speedster.

2—How will I lower the steering wheel?—J. J. Currie.

1—A suggestion for this is shown in Fig. 9.

2—It is hard to say just what you will have to do to lower the steering column, but usually this can be done by removing the bracket on the frame of the car and fitting wooden wedge-shaped pieces to accommodate the new angle of the post. The same thing will have to be done on the dash.

THE SECRET OR HIDDEN SWITCH

Various Ways to Render the Ignition System Inoperative

Chicago, Ill.—Editor MOTOR AGE—One way to prevent a car from being stolen is to install a secret or hidden switch, which is so constructed that it will ground, or in some other way throw the ignition system out of commission. Such a switch can be installed on Ford cars, or cars having either a battery or high tension magneto form of sparking system.

In the case of a Ford, the switch is installed as shown at the top of Fig. 10. Connect one wire from the secret switch to the magneto terminal, or to the coil terminal, as shown in the illustration. Run one wire from the secret switch to the frame of the car, thereby grounding the wire. When it is desired to leave the car, the ignition switch is worked as usual, then the lever of the secret switch is thrown into on position. If some unauthorized person attempts to start the car, the magneto current will be grounded and it will be impossible to start the car.

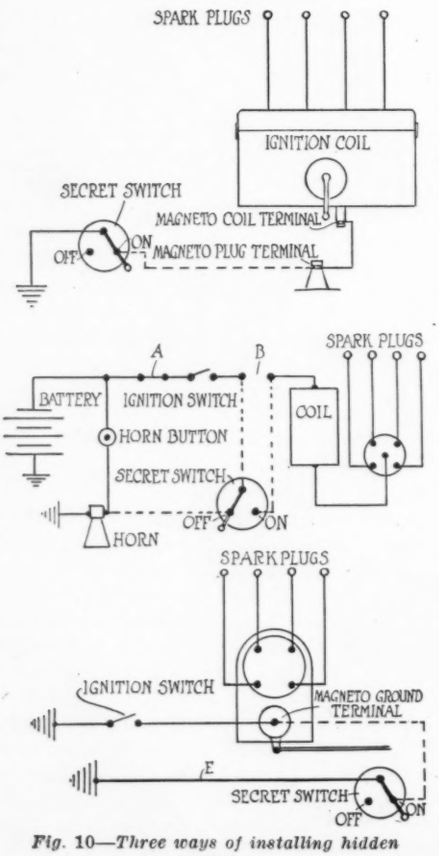


Fig. 10—Three ways of installing hidden switch

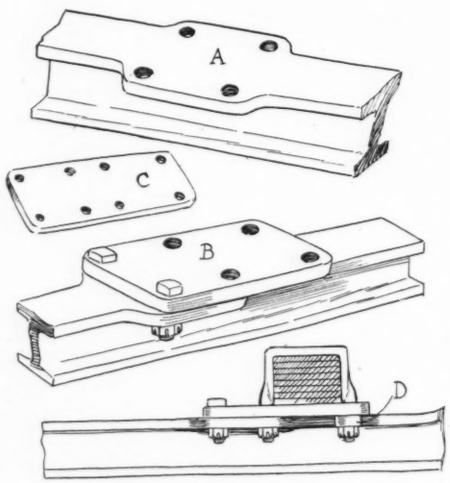


Fig. 11—Attaching extra spring perches to front axle

If the car is equipped with battery ignition for starting or running the connections must be made as shown in the middle diagram. Cut the battery wire from the ignition switch to the coil and connect the secret switch as shown by the dotted lines. If the ignition switch and coil are built into one unit, cut the battery wire at A, connecting the secret switch as before described. The electric horn can only be connected into the system when the secret switch is cut in at B. On a few cars the horn button is located between the ground and the horn and in this case simply change it to conform to the other diagram. If an attempt is made to start the car by operating the ignition switch the horn will be sounded, provided the secret switch has been thrown in the off position. No current will flow through the coil.

The lower diagram is used when the car is fitted with magneto ignition. Connect one wire from the secret switch to the magneto grounding terminal, as shown by the dotted lines, or to any place between the ground terminal and the switch. Run a wire E from the secret switch to the frame of the car, thereby grounding the wire. When the secret switch is thrown in the on position and attempt made to start the car, the engine will not run, inasmuch as the current from the magneto will be grounded.—Bert Gyllin.

REASONS FOR KNOCKS IN CHASSIS

Where to Look For Irritating Squeaks and Rattles

New York City—Editor MOTOR AGE—There are some noises and knocks in a chassis sometimes so obscure as to defy detection even by the expert. Such was the case in a car which developed a sharp click when it was started forward or backward. It ran quite a long time before it was possible to discover just what and where it was. It was somewhere in the back end, but so hidden as to defy detection. The rear axle was of the floating type, the construction in which the driving shaft is connected to the hub of the wheel by a number of flutings on the shaft, into which corresponding projections of the flange fitted. These had become worn and allowed sufficient play to cause a noise.

By walking alongside the rear wheel while the car was being started and stopped, it was apparent that the sound came from the hub of the wheel. The hub

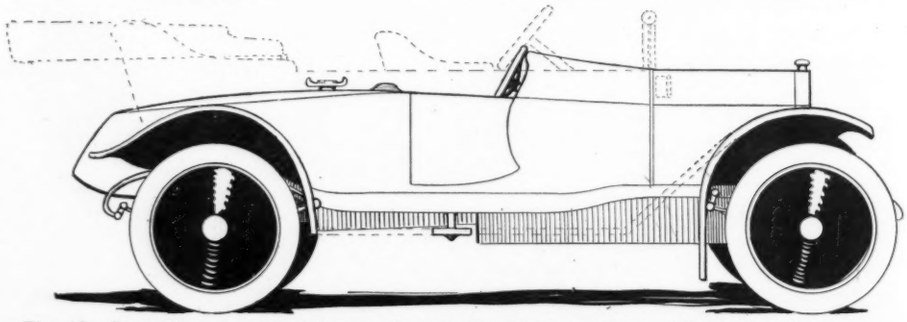


Fig. 12—Suggestion for converting an Everett Six into a roadster. The dotted lines are part of the old body

cap was removed and by placing the finger on the hub flange and end of shaft at the same time the play was detected by the sense of feeling, though it was hardly visible to the eye. The trouble was overcome by having the shaft welded to the flange.

I have seen cases where the wheel was keyed on and where the keys had acquired sufficient play to cause a continuous knocking, especially when the machine was driven at low speed. This sort of knocking is more likely to occur with the four cylinder, slow speed engine.

A mysterious knock sometimes may be traced to the torque rod, which becomes loose at the forward end, or to worn torque tube bearings, and in some cases the bolts fastening the torque rods to the rear axle become loosened, or worn, causing a knock, especially when going over bumps or dropping into holes.

The brake rods become worn and set up a continuous clattering on rough roads, and this noise is accentuated if the tires are kept inflated at too high a pressure. As a matter of fact, the car owner has the choice between the greatest life for his tires with accompanying rattles and discomforts and riding at a sufficiently low pressure to subdue these noises and make life in a car worth living. Of course, there will be attendant higher wear of tires.

Worn spring shackle bolts will not ordinarily cause knocking or rattling, but when going over bumps or holes the rebound of the body is sufficient to make the looseness audible. It can be overcome by having a new bolt put in, and prevented by keeping the bolts well lubricated. Worn steering knuckle pins and tie rods bolts will be found responsible sometimes for knocks and rattles in the front end of the car. The remedy is obvious and the location of the noise is not hard to find.

There are other knocks due to broken gear teeth and other broken parts, and sometimes these broken teeth, loose nuts, bolts or pins, in gear or differential case become wedged between the gear teeth and cause a knocking that is not hard to locate. And then there are the knocks and rattles from the hundred or more accessories which are attached to the chassis of many cars and which sooner or later develop defects and noises.—C. A. Starr.

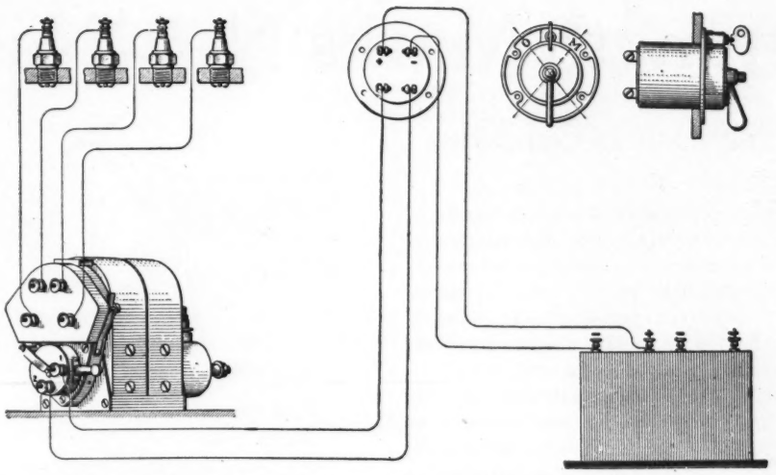


Fig. 15—Diagram showing the arrangement of the ignition wiring on the 1913 Mitchell

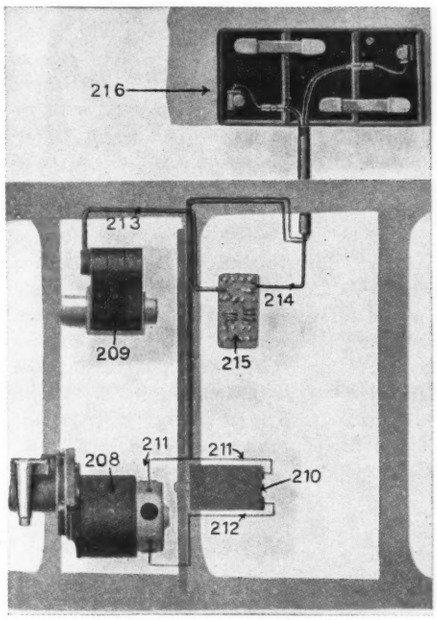


Fig. 14—Starting system used on 1913 Mitchell

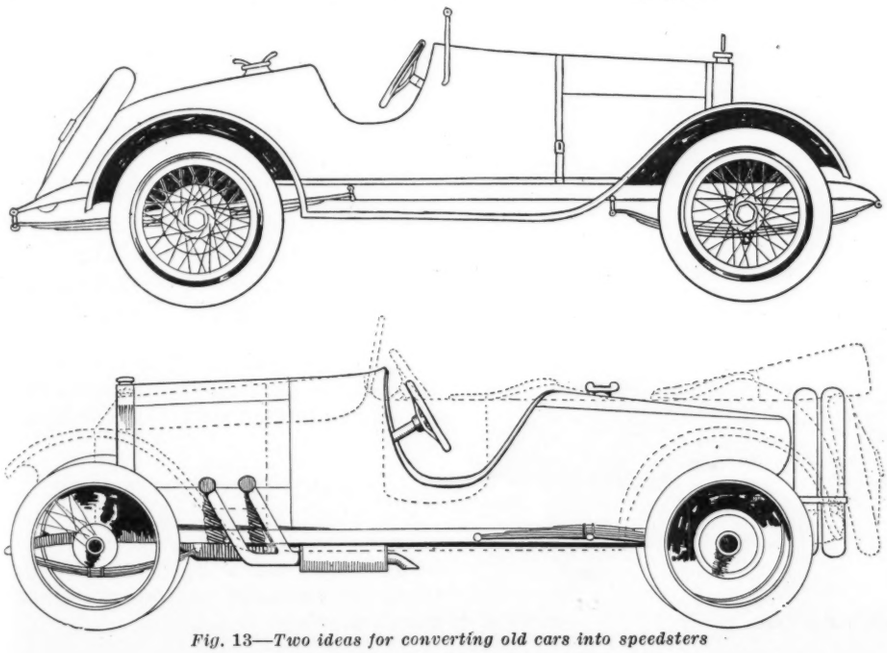


Fig. 13—Two ideas for converting old cars into speedsters

WINTON FRAME WILL NOT FIT

Necessary to Fit Steel Plates on Spring Perches

Courtland, Ala.—Editor MOTOR AGE—I am rebuilding an Everitt six, using Winton axles, transmission and clutch. The Winton frame is wider than the Everitt. What is the best way to fit the springs to the front axle?

2—Illustrate a design of four-passenger body for this car, using the same radiator and hood. Would like a boat-shaped body and as low as possible, using fenders but no running boards, and disk wheels.—Morgan Sherwood.

1—A scheme for attaching the springs to the front axle where the frame is too wide to line up with the spring perches of the axle, is shown in Fig. 11. At A is shown the conventional form of perch and B shows a piece of boiler plate drilled for the holes in the perch. The piece B is also drilled to take the shanks of the spring clips. If the car frame is extra wide, it may be necessary to lengthen the plate B and drill it as shown at C. Plate B is fastened in place with bolts the nuts of which must be secured with cotter pins. The nuts on the clips are secured in the same way. A distance piece, D, is fitted to the outside shank of the clips to take up the space made necessary by the plate B.

2—The car rebuilt with a boat-shaped body is shown in Fig. 12.

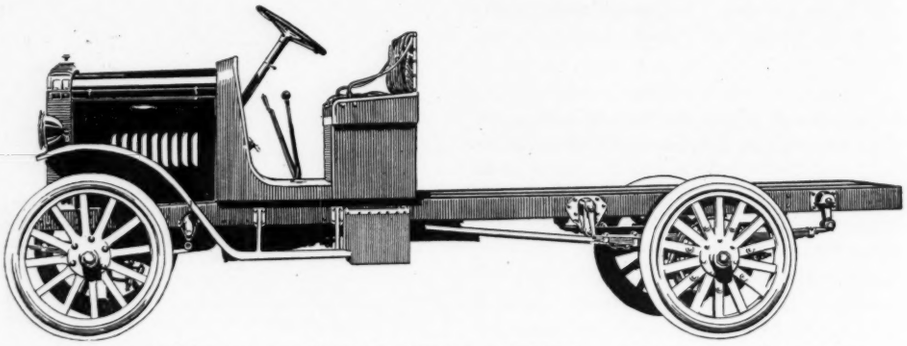
Wiring a 1913 Mitchell

Grand Rapids, Mich.—Editor MOTOR AGE—Publish the wiring diagram for both starting and ignition systems of a 1913 Mitchell. This is a four cylinder model using a Bosch duplex system. This car has a fan driven by a train of inclosed gears. The generator is on the right side of the driveshaft and the starting motor on the left side.——Harold Ringold.

These diagrams are shown in Figs. 14 and 15.

Strength Marks New Nash 1-Ton Truck

Wheelbase Is Generous



Nash 1-ton light duty truck with wheelbase of 130 in., with rated load capacity of 2000 lbs.

ANNOUNCEMENT has been made by the Nash Motor Co., Kenosha, Wis., of a new 1-ton truck, having a generously long wheelbase of 130 in. It is primarily a light duty truck, yet designed sufficiently strong to stand up under abnormal stresses if necessary. A glance at the chassis reveals clean, turdy contruction and the absence of torque arms and radius rods, due to the Hotchkiss type of drive through the springs. Another feature is the simplex type of governor which automatically shuts off further fuel supply after the truck has reached a speed of 20 m.p.h. This prevents speeding on the part of a careless driver. The rated load capacity is 2000 lbs., while the maximum weight allowed on the chassis, including the body is 2900 lbs.

Semi-elliptic Springs

The frame is pressed channel steel 5 in. deep and supported both in front and rear by semi-elliptic springs. The front axle is I-beam in section, while the rear axle is dead and carries the load only. To transmit the power of the engine to the driving wheels, the latest type of Celfor rear axle driving system is employed. This embodies the M. and S. self-locking differential. The drive is taken by shaft from the transmission to bevel gears in the differential, thence by transverse shaft to a driving pinion meshing with an internal gear in each rear wheel. Drive and torque are taken through the springs. The gear reduction on third speed is 6.8 to 1. The rear wheels carry the service brakes, while the emergency brake, which is of the contracting type, is carried on the drive shaft close to the transmission case. Artillery type of wheels is fitted, equipped with solid tires measuring 34 by 3 in front and 34 by 4 in rear. The ground clearance under the axles is 9¾ in.

Inspection of the engine reveals a four-cylinder proposition of the L-head type with cylinders cast in block. It is of 3¾ in. bore and 5¼ in. stroke. An unusually large crankshaft of 2 in. diameter is fitted, which is suspended from three large bearings. The valves are on the right side of the engine and measure 1¾ in. in diameter. The radiator is of the cast type with removable tubular core. The water is circulated by a centrifugal pump. A four-bladed fan is fitted, equipped with a spring tension bracket. Ignition is taken care of by the Delco system, with storage battery. Lubrication is by combination force-feed and splash. The plunger pump for the oil is operated from an eccentric placed on the camshaft. A 1¼ Stromberg carbureter provided with a hot-air intake furnishes the mixture to the cylinders. Gasoline is fed by gravity to the carbureter from a 16 gal. tank placed under the seat.

The drive from the engine is through a dry-plate clutch fitted in the flywheel. The clutch has two plates of friction material and one of steel. Two studs for taking up wear are located on the outside of the clutch. The transmission is in unit with the engine. It is of the selective type, giving three speeds forward and one reverse.

All crankshaft bearings in the engine are of the plain type, the front ones being 3¼ in. long. The rear and center bearings are 4½ and 3¼ in. long respectively. All three have the same diameter, which is 2 in. The connecting-rod bearings are die-cast babbitt 2½ in. long and 2 in. in diameter.

Rear axle of new Nash 1-ton truck

Hand cranking has been done away with by the installation of a Bijur starting and lighting system, operated with a Bendix drive. As stated above, the Simplex governor which is of the four-ball, centrifugal type fitted with grid valve, cuts off at a car speed of 20 m.p.h. or at an engine speed of 1345 r.p.m. The governor is operated from the engine by a flexible shaft drive. Other controls, such as the spark and throttle are located conveniently on top of the steering wheel. The carbureter air control is placed on the steering post. The latter is placed on the left hand side of the chassis, giving center control. In addition to the hand throttle, a foot accelerator is fitted, operated by the right foot.

Equipment consists of horn, tools, jack, etc., besides the starting and lighting system. The chassis is painted in lead. If a body is ordered with the chassis, the body price includes painting both the body and chassis, unless otherwise specified. The price of the standard chassis is $1,450. The price of a stake platform is $125, while that of a flared express body is $100.

TO INCREASE SPRINGFIELD STOCK

New York, June 30—Notice has been given the stockholders of the Springfield Body Corp. of a special meeting to be held at the office of the company July 13. The stockholders will be asked to vote upon a proposition to increase the capital stock to $3,000,000.

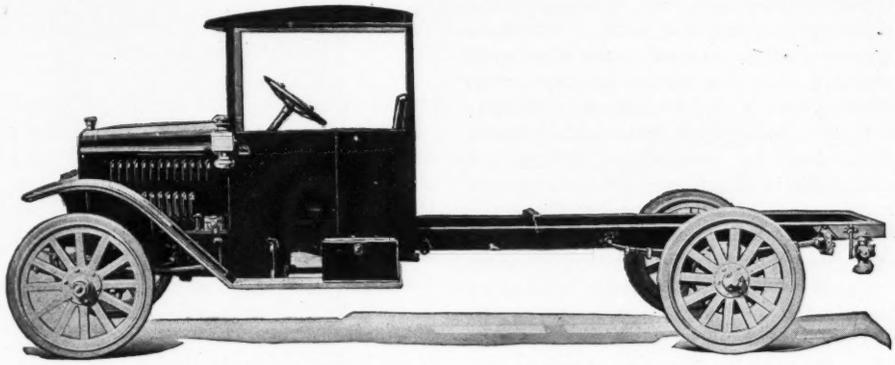
PIERCE-ARROW PROFITS

New York, June 30—A net manufacturing profit of $1,341,132 is reported by the Pierce-Arrow Motor Car Co. for the four months ended April 30. This is after all taxes, except for excess profits, and after allowing for interest and $156,444 depreciation.

TO MAKE CRESCENT TRUCK

New York, June 30—The Crescent Motor Truck Co. has been incorporated to enter the market with a 1500-lb. delivery car to be an assembled proposition selling around $1,000.

Kissel Defines New Models in Names



New Kissel general utility truck with capacity of 3400 lbs. for chassis and body, selling at $1,485

LONGER wheelbase and loading space, together with the all-year cab, are the outstanding features of the new line of Kissel trucks announced by the Kissel Motor Car Co., Hartford, Wis. Descriptive names are given to each of the new models, giving a good idea of the capacity and to some extent the uses for which the trucks are built. The newcomers are called the Flyer, General Utility, Freighter, Heavy Duty and Dreadnaught.

All five models are equipped with the Kissel-built engine, the first two having a bore and stroke of 3⅞ by 5½ in. respectively, while the larger models are 4¼ by 5½ in. The Flyer has a special bevel-gear drive; a worm-drive being used on the others. The chassis capacity, with body, ranges from 2250 lbs. for the smallest to 11,800 lbs. for the Dreadnaught.

The General Utility truck represents an all-around truck for average conditions. It has a capacity of 3400 lbs., clear loading space of 10 ft. and a total gear reduction of 6.5 to 1 on high. The front and rear tires of this model are 34 by 3 and 34 by 4 in. respectively. It has a wheelbase of 152 in. Both of the two largest models are built for heavy work, being especially adapted for use among contractors, road-builders, etc.

On the four largest models, the all-year cab is standard. This, however, is without the winter attachment. The Flyer is equipped with the Kissel standard open seat. To change the open summer cab to an all-year cab, the winter attachments, consisting of windshield, side, door and rear windows, costing $50 extra, are easily attached. The prices of the first three models in their respective order are $1,085, $1,485, and $2,100. The Heavy Duty and Dreadnaught sell for $2,950 and $3,750 respectively. All these prices are for the chassis only.

New Wisconsin Axle

The E. B. Hayes Machine Co., Oshkosh, Wis., is putting out a worm-driven, semi-floating rear axle for trucks of 1 ton capacity. The housing costing is one piece thoroughly reinforced by a box type of rib which takes care of all strains and shocks, it is said. This also allows for minimum weight with maximum strength. All forms of truss rods are done away with by this construction. The housing castings are sand-blasted and annealed to give a tensile strength of 75,000 lbs., with an elongation of 30 per cent. The axle shaft is made of heat-treated steel and tapered to eliminate considerable whipping, thus adding to the life of the shaft. The axle shafts are carried throughout on U. S. ball bearings of the heavy duty type. The axle spindle is made exceptionally large in diameter where it fits into the bearings at the ends of the housings. This makes it possible for the bearing to take the extreme thrust and radial loads. A unique looking device is fitted on the ends of the spindles for holding the bearings in place on the driving shaft. By removing the locking devices the axle shafts can be withdrawn without disassembly of the whole rear axle.

Flyers and Dreadnaughts

The worm and wheel, together with the differential are mounted as a unit on a one-piece casting which forms the cover for the case. Incorporated in the axle is a Bailey heavy duty type of gearless differential, affording a positive two-wheel drive, the characteristic feature of this differential. The worm is of alloy steel, while the wheel is of alloy-bronze. Minimum friction with maximum wear is claimed for this combination. The bearings on each side of the differential are mounted in separate cages.

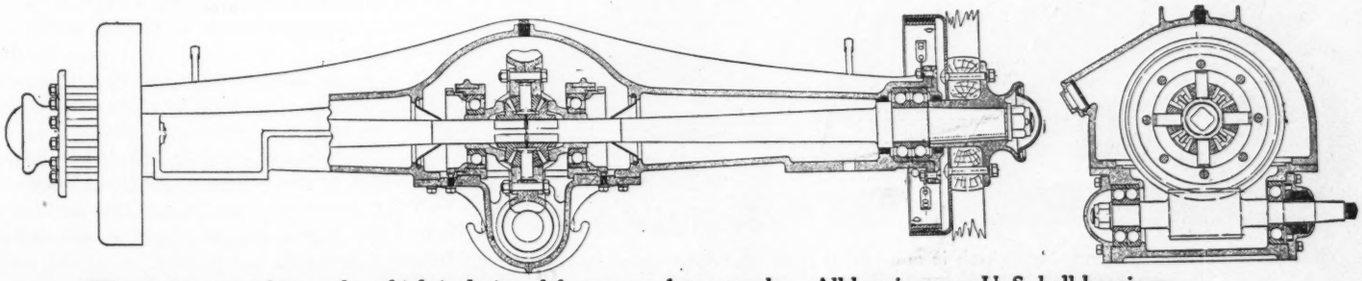
The axle is furnished with single or double brakes as may be desired. The internal brakes are 2½ in. wide and expand in a drum 14 in. in diameter. The same drum is used for the external contracting brakes which are also 2½ in. wide. Special grease retainers are fitted to prevent leakage in the axle ends. Hub caps of the usual kind are done away with by a unique construction of the hub casting. Gear ratios of 6½, 7, or 7¾ to 1 are furnished.

BRAZIL NEEDS FARM TRACTORS

Washington, D. C., July 2.—Another market for the foreign tractor, should the American manufacturers get in position to supply the demands for tractors may be found not only in this country but in Brazil, as the present prosperity of Brazil has led to a renewed interest in modern agricultural methods and to a demand for all sorts of American farm machinery and implements, according to a report by the Bureau of Foreign and Domestic Commerce. It is expected that the industrial and agricultural revival that has taken place in Brazil since the first period of depression that followed outbreak of the war will make itself felt for many years to come.

Agricultural conditions in each of the Brazilian states is described at length in the report, and the point is made that small farms and intensive cultivation are the rule rather than very large farms and extensive methods such as exist in Argentina.

The situation in Brazil emphasizes the importance of supplying the demand for tractors, as more crops in Brazil would mean a greater supply of foodstuffs for the United States in the present war.



Wisconsin worm-drive axle, which is designed for use on 1-ton trucks. All bearings are U. S. ball bearings

Nine 1918 Buick Models

Differences of Bodies and Equipment—Passenger and Light Commercial Types

FLINT, Mich., June 27—The Buick Motor Co., in addition to the model E 6-49 described in MOTOR AGE for June 21, will turn out eight other models for 1918, details of which have just been announced. These include model E 6-44, a three-passenger roadster; model E 6-45, a five-passenger touring car with dull finish, black leather upholstery, buttonless cushions, a special one-man top, and a rain vision, ventilating type windshield; model E 6-46 and model E 6-47, which are upholstered in motor car cloth and have convertible stationary tops and three-piece, storm-proof, ventilating type windshields.

Models E 6-44, E 6-45 and E 6-47 have 18-in. steering wheels, left drive, a semi-reversible split nut nad worm type steering gear, a 118-in. wheelbase and 34 by 4 straight side tires, non-skid in the rear. Models E 6-44 and E 6-45 are listed at $1,265; E 6-46 at $1,695; E 6-47 at $1,795. All the above models have semi-elliptic front springs and floating cantilever rear springs.

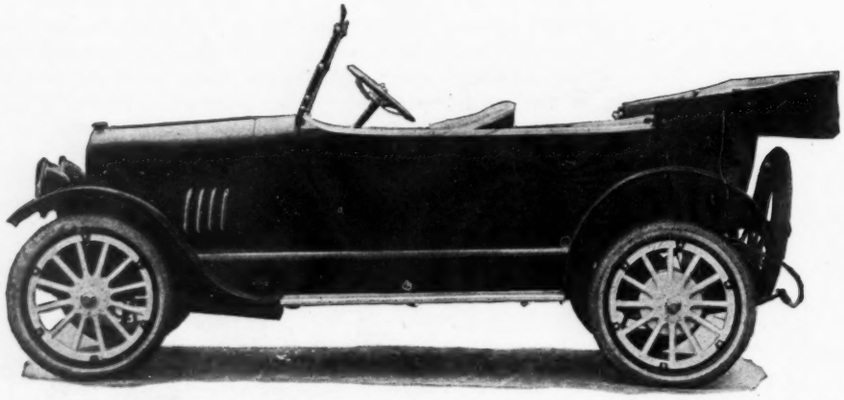
Model E 6-50 is a seven-passenger touring sedan with permanent top and disappearing glass side panels, upholstered with high-grade motor car cloth. It has a 124-in. wheelbase, straight side tires, non-skid in the rear, a 19-in. steering wheel and the same spring equipment as the other models, but with shock absorbers in front. A special one-man top with full back and gypsy curtains is fitted, as is a three-piece storm proof ventilating windshield.

Models E 4-32, a two-passenger roadster, and E 4-34, a five-passenger touring car, sell at $795 each. These have 106 in. wheelbase and 31 by 4 in. clincher, non-skid tires. A unit powerplant is fitted with three-point support on the main frame. The engine has four 3⅜ by 4¾ in. cylinders. Lubrication, carbureter, ignition, starter, transmission, drive, brakes, wheels and frame are the same as on model E 6-49 described last week. The clutch is a leather faced cone wtih expanders under the leather. The rear axle is of three-quarter floating type and fitted with roller bearings and ball thrust bearings. The steering gear is of the semi-reversible split nut and worm type with 16-in. wheel. Extra long flat semi-elliptic springs are used both in front and rear. A special one-man type of top clamps directly to the windshield when extended. The standard equipment includes a ventilating, slanting design windshield, double bulb headlights, electric tail and instrument lamps, speedometer, electric horn, tire carrier with extra demountable rim and complete tool equipment.

Model E 4 is a light delivery wagon with a Buick 3⅜ by 4¾-in. valve-in-head engine, and sells at $790, with an open express type body, canopy top and side curtains. It has a loading space of 42½ by 70 in. and a carrying capacity of 500 lb. The body is finished in dark green, while the fittings, hood, radiator, fenders, skirt, wheels and chassis are black. The wheelbase is 106 in. Thirty-five brake horsepower is claimed for the engine. The rear axle is of the three-quarter floating type. Tires are 31 by 4 in. clincher, non-skid. Cooling system, lubrication, carbureter, ignition, starter, clutch, transmission, control, drive, brakes, etc., are the same as on model E 4-34.

MONTEVIDEO USES FEW TRUCKS

Washington, D. C., June 29—A careful canvass of Montevideo shows about 120 possible users of motor trucks. About 20 per cent of these use trucks now. At first some concerns made the mistake of purchasing heavy duty trucks. Local conditions favor the light trucks. The largest local user of trucks is reported to have said that when his six heavy vehicles give out they will be replaced by light machines. Except the breweries and a few other concerns, there is apparently little opening for heavy trucks. Hauls are short and horses cheap.



Side view of Gem touring car, which is assembled from standard units and will sell for $845

Carlisle Cord Tire Out

Continuous Layers Features Distinctly New Type with Lightning Tread

THE Carlisle Cord Tire Co., Inc., has been formed to manufacture and market a cord tire of a new type, produced under methods quite different from others. Factory facilities will be located at Andover, Mass., though the executive offices will be in New York. J. S. Bretz, president of the Bearings Co. of America, is president; F. B. Carlisle, for whom the tire is named, vice-president; Frank Williams, president of the Broadway Central Bank, New York, treasurer; and Frank R. Serles, secretary. The officers, J. M. Gilbert, known in the tire trade through his presidency of the Continental Canoutchouc Co., and H. von Breisen, compose the board of directors.

The Carlisle cord tire is to be made in all regular and over sizes and will sell for approximately the same prices as other high class makes of cord tires. It is to be made in all styles, straightside, clincher and Q. D.

The particular feature of the tire is that it is made in a long continuous cord in two layers placed diagonally over each other. In the building up process the cord is wound diagonally over the stranded wire beads to form a flat cylinder. Complete, the layer of raw rubber between the layers of cords, an air bag is placed inside the cylinder, thus drawing the beads together and forming the tire to its proper shape with an equal tension on all cords.

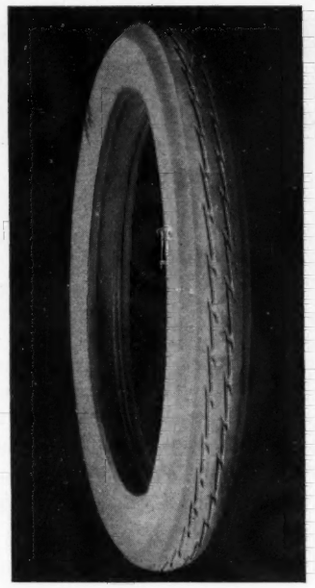
Each Section Separate

Each section of cord is slightly separated from its fellow in the forming process, so that after the side walls, cushion, stock, breaker strip and tread are put on and the vulcanization is completed each cord is isolated from the next. In consequence, internal friction is eliminated. The cord is of the same thickness for its entire length and is tested to withstand a strain of 235 lb. Because of the process and the use of a new and simple type of machine for laying the cords, it has been found possible to use a grade of American cotton.

The tread has been given the trade name "Lightning" and is of the depressed type, thus giving all the smooth riding qualities of a smooth tread tire, yet providing an angularity of road contact which should prove an effectual bar to side slip. The tire will have white side walls and a black tread.

It is stated that tires which have been under test for the last two years have given mileages in excess of 10,000 in normal service and that it has been the experience of the company that treads invariably are worn out before the useful life of the carcass is gone. In this case retreading is urged.

The construction is said to be no bar to



Carlisle cord tire with Lightning tread

simple and easy repair. In the case of blow-outs, sections of the cord can be replaced by the ordinary method.

So confident are the makers in the ability of the tire to give more than normal service, no definite mileage guarantee has been placed on it. Instead, the guarantee states that "Carlisle cord tires are guaranteed to give perfect satisfaction; any time we will correct any mistake made in their manufacture at our expense and without dispute or delay."

The company expects to start active production Aug. 1.

RACINE TIRE TO EXPAND

Racine, Wis., June 29 — The Racine auto Tire Co., Racine, Wis., organized in 1910 with a capital stock of $500,000, has announced plans for the erection and equipment of a complete new tire and tube plant with a capacity of 7500 tires a day and employing from 3000 to 4000 operatives. The present plant produces 400 tires a day and employs 150 men. Work will begin about Aug. 1 and be completed early in 1918.

The Racine Auto Tire Co. features the Horseshoe tire and is distinct from a tire and rubber company of similar name in Racine. The officers are: President, L. J. Elliott; vice-president, J. H. Wright; secretary-treasurer, Clarence Wright.

NEW CAR IS ANNOUNCED

Kalamazoo, Mich., June 30—The Wolverine Motors, Inc., has been organized here to manufacture a high grade four-cylinder speed roadster and four-passenger touring car. The capital stock is $125,000. The officers and directors are: President and general manager, A. M. Collins; vice-president and assistant manager, Harry A. Scott; secretary, Howard W. Rice; treasurer, F. W. Holmes. These four and William H. Scott are the board of directors.

Mr. Collins has had a long experience in the motor field, having been with the R. C. H. company, Detroit; Staver Automobile Co., Chicago, and the Locomobile Co. of America. He is the organizer of the Wolverine-Detroit Motors Corp., which has been moved from Detroit and merged into the present concern.

Harry A. Scott will have charge of production.

The new concern intends to get out several demonstrators for 1918 and in the meantime will get a permanent factory to be ready for active production for the 1918 market. The cars will sell for $3,000 and up and the number produced will never be in excess of about 1000 annually.

NEW CHICAGO DEALER MERGER

Chicago, June 29—One of the most important of the movements in the distribution field of the Chicago territory is the recent alliance of Harry Newman and G. W. Stratton. The new corporation is to be known as the Harry Newman-Stratton Co. Stratton has been the King dealer in this territory for some time and Harry Newman has been one of the most talked-of men in dealers' circles. Until the new merger was effected he has been the distributor of the Hal-Twelve, and previous to that time handled the Chalmers and before that the Scripps-Booth.

In the new merger, Newman and Stratton unite their interests in the Hal-Twelve and the King, and they also take over distribution of the Maxwell. The factory branch that has been handling the Maxwell has suspended its operation. The Harry Newman-Stratton Co. also will handle the Ranier half-ton trucks, the territory for this covering Northern Illinois, Wisconsin and Indiana. The quarters formerly occupied by Harry Newman, Inc., when it was "recommending" Chalmers cars, will be the home of the new concern, and branches are to be operated in Milwaukee, Springfield and other centers. A contract for $15,000,000 worth of Maxwells has been made.

Gem Offers Two Models

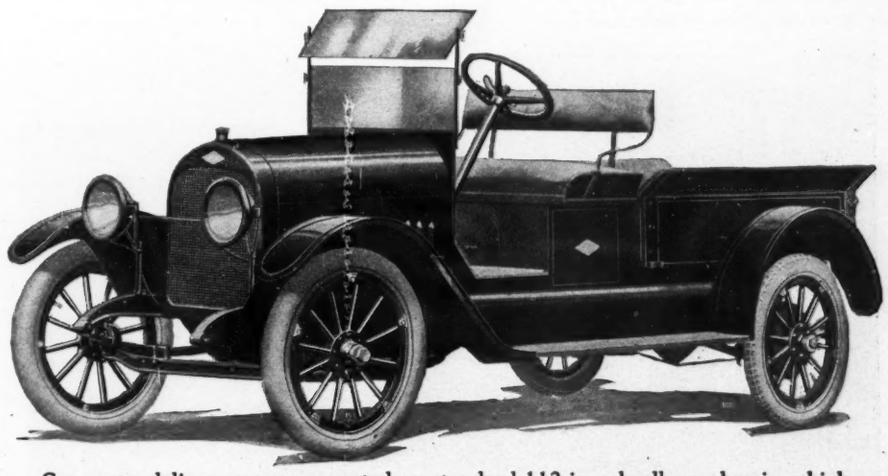
Touring Car and Light Delivery Wagon on Same Chassis and Low-Priced

THE Gem Motor Car Corp. of Grand Rapids, Mich., is putting out a touring car and a light delivery wagon on the same chassis. The touring car is standard, while the delivery wagon can be secured in an open express body with canopy top or as a full panel job. The price of the touring car is $845, f.o.b. Grand Rapids, and of the delivery wagon, $675, with open express body. With a canopy top the price of the latter is $700; with a full panel body, $725.

The specifications of the new car show it to be assembled from standard units. The engine is a Golden, Belknap & Swartz; carbureter, Carter; electric lighting and starting system, Dyneto; clutch, Golden, Belknap & Swartz; gearset, Grant-Lees, and the axles, Walker-Weiss. It also is fitted with a Lavine steering gear and Stewart speedometer.

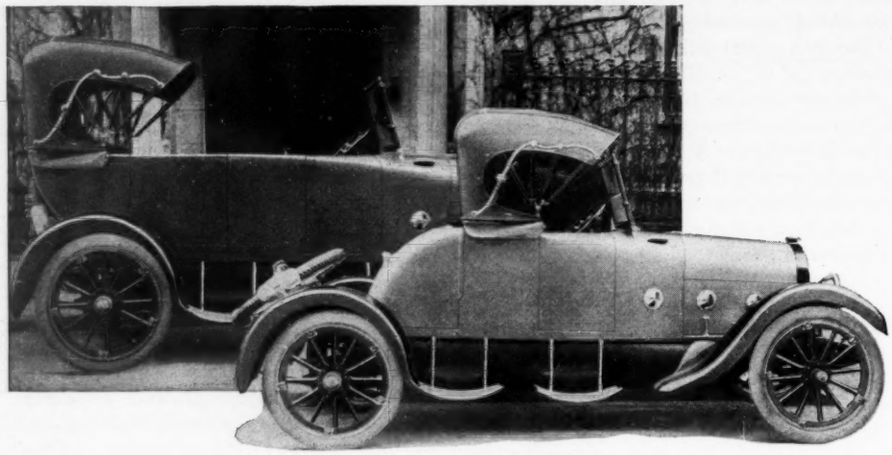
Four Cylinders

The powerplant is a four-cylinder, 3¾ by 4¼ L-head block, giving a unit powerplant with three-point suspension. The camshaft drive is by silent chain, and lubrication is by circulating splash, with a piston type pump. The electrical system comprises a starting and lighting outfit operating at 6 volts and a battery ignition system working in connection with a Detroit 6-volt, 80 amp. hr. storage battery. The drive is taken from the engine through a Golden, Balknap & Swartz plate clutch, running in oil, to the three-speed selective gearbox. The final drive is a bevel gear system with the propulsion and torque taken by the Hotchkiss drive method through the rear springs. The reduction in the rear axle is 4 to 1, and the tires are 31 by 4 in. Millers. The wheelbase is 112 in.



Gem open delivery wagon mounted on standard 112-in. wheelbase chassis, which sells for $675

The Accessory Corner



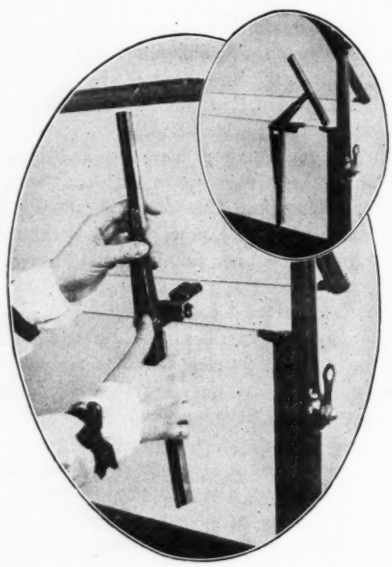
Carrm convertible body, offered by the American Motors, Inc., a touring car inside a roadster, in its two characters

Airgo Starter for Ford Cars

THE General Appliance Co., Detroit, has produced a new starter for Ford cars which operates by compressed air. No part of the car is removed or interfered with in installing this starter. A large storage tank placed under the car automatically refills as the engine runs. Essentially there are four units to install, consisting of the starting unit on the end of the crankshaft, the air tank, air valve and the carbureter choke pedal. The starter sells complete for $39. Another feature of this outfit is that a hose can be attached when desired and the tires pumped up by the air in the tank.

Lalley Lighting Plants

The motor car dealer is a new type of merchandiser. He has had to depart from many of the principles and precepts of the average retailer, and gage new markets and create new methods of his own. These have met with such success that he is ready to apply them to other lines, as shown by the experience of the Lalley Electro-Lighting Corp. of Detroit. This concern manufactures electric lighting plants for us in country garages, farms, country homes, camps, boats, etc. It is marketing its product very largely through established motor car dealers throughout the country. It is finding that the "carload" habit operates as well in the lighting plant business as in the motor business.



Universal rain rubber to clear windshield

Ing-Rich Radiator Shield

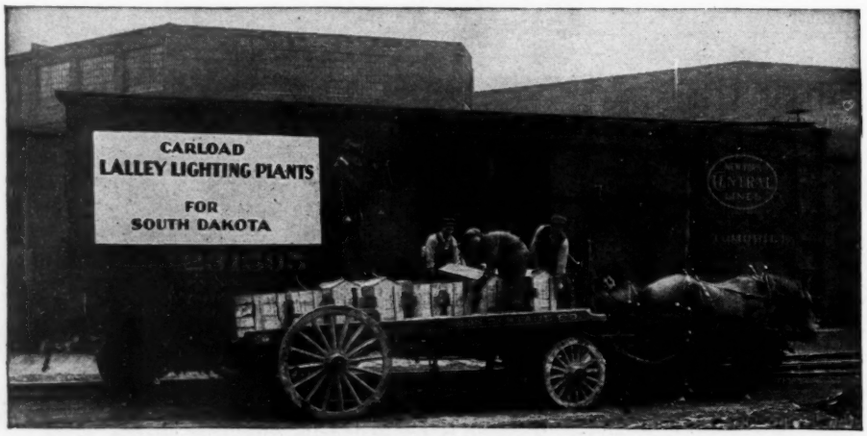
This is a radiator shield representing old glory in the conventional form, being made of heavy steel and porcelain enameled in colors. It measures 4 by 4½ in. and can be mounted either on the radiator cap, or on the front of the radiator itself. Attachment is made easily with wire, bolts or screws. It retails for 50 cts., with a special price to the trade of fifty for $15. Ingram-Richardson Mfg. Co., Beaver Falls, Pa.

Carrm Convertible Body

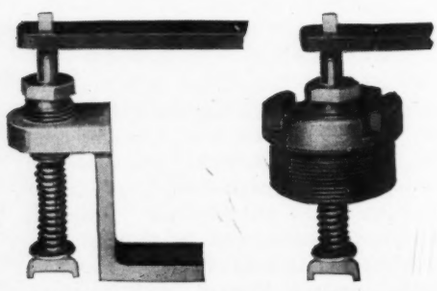
A touring car inside a roadster has been made possible by the introduction of the Carrm convertible body by the American Motors, Inc., New York City. The transformation of making a roadster into a five-passenger touring car is said to take but 2 min. When used as a roadster the doors are inclosed, together with the folding seats of the tonneau. Attention is called to the clever way in which the top is manipulated and to the way in which the spare tire holder at the rear of the car is made to tilt, thus allowing sufficient clearance for the end of the body when the latter is thrown back to make a touring car.

Overholt Compressor and Generator

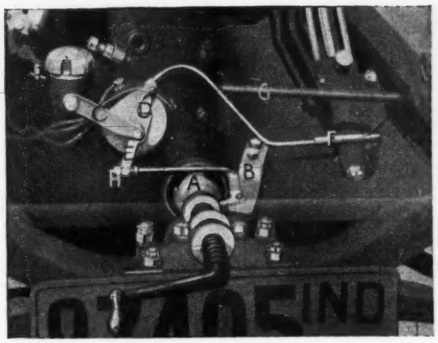
This outfit is for inflating tires and charging storage batteries. It is portable, being mounted upon a truck. The apparatus is furnished complete with lamp socket, switch and cord that reach the battery without taking out the car. The electric motor is ¼ hp. alternating current,



Shipping Lalley lighting plants for garages, farms, etc.

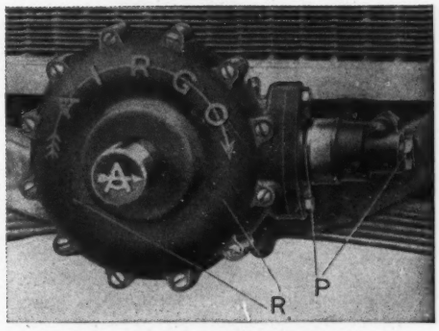


The Kandikid, a handy tool for grinding valves



Bill automatic spark retarder for Ford car

Walker Ke-Less lock, described in MOTOR AGE *of June 7*



The Airgo starter, which operates by compressed air

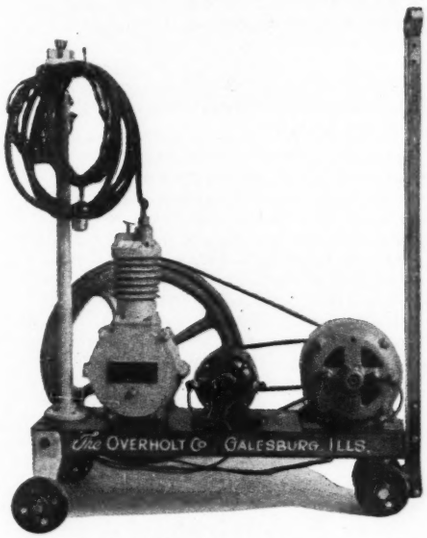
110-115 volts 60 cycle. Where desired direct current motors can be had. The air compressor has a cylinder of 2⅛ in. bore and a working pressure of about 175 lbs. A large size tire can be inflated in about 2 min., it is said. Fifteen feet of air hose come with the outfit. The generator is designed to charge any 6 volt battery. It has a capacity of 7 volts and 7 amp. The price of the outfit as shown is $120. The motor air compressor set alone sells for $90, while the motor-generator set for charging batteries also sells for the same amount. As shown the outfit comes belted all ready to run. The Overholt Co., Galesburg, Ill.

Multiple Die Stock

This die stock is new in design and has an adjustment device that will allow a wide range of work. The frame is made in two sections, with jaws to hold the cutter-blocks exact by gage pins. On one end there is a hinge with an eccentric rivet that allows of adjustments in 16ths, 32nds, and 64ths, to make a tight or loose thread at will. The hinge also allows the member to swing to the opposite side to match the outside cutters. The handles can be folded and in this position the tool measures 3¼ by 9 in. It weighs 3¼ lbs. and will cut threads from ¼ to ¾ in. The price is $12; the nickel finish costing 50 cts. extra. Dies in all of the standard sizes of U. S. S., Whitworth and S. A. E. threads are carried in stock. Carl L. Winberg, 1105 Mallers Bldg., Chicago.

Universal Rain Rubber

A clearer for windshields, known as the Universal Rain Rubber which clears both the top and bottom glass at the same time is made by the Tri-Continental Corp., Buffalo, N. Y. It attaches instantly, holds firm but slides without effort. Multiple rubber, two pieces of rubber, make the cleaner flexible with two cleaning surfaces on each arm. The rivets are topped with celluloid heads, which will not scratch the glass. •A single stroke of the hand moves it from one side to another. It has a traveling section which slides in the slot between the two glasses. The whole device can be removed by lifting it off after opening the windshield. It is made in five styles, designed to cover most of the two-piece windshields now on the market. The price of the cleaner is $1.50.



Overholt outfit for inflating tires and charging storage batteries

Kandikid Valve Grinder

A handy tool for the car owner or garageman to have has been marketed by W. C. Brown, Niles, Ohio, in the shape of a valve grinder called the Kandikid. It can be used on engines having a removable cylinder head or where the spark plug caps placed over the valves are removable. The two types are shown in the illustration. The machine is set over the valve with cap screw in bolt hole situated equi-distant from the first and second valve. The pressure block is now turned down and the valve is ready to grind. With this outfit it is just as easy to grind a valve under a dash board as any other place. With removable spark plug base, the machine is placed in the port cap hole, turned down to proper pressure and the grinding begun.

Burd Piston Ring Directory

The Burd High Compression Ring Co., Rockford, Ill., has just issued a new piston ring directory which, besides giving the sizes of rings used in the various makes of cars, tractors, motorcycles, etc., contains some valuable information about the proper installation of Burd rings. The price of the 1917 directory is 50 cents.

Bill Automatic Spark Retarder

To protect the Ford owner from injury in cranking his car should he have the spark too far advanced, an automatic spark retarder has been brought out by the Bill Mfg. Co., La Porte, Ind. This device also advances the spark to the proper running point after the engine has been started. It is entirely automatic in operation, requiring no attention on the part of the driver, nor has it any effect on the timing or other phases of ignition when the engine is running under ordinary condition. The driver can stop his engine with the spark fully advanced and leave it there, whereupon the Bill spark retarder will shift it back to the safety point in starting. The action is such that when the crank is placed in engagement on the shaft extension, the commutator is rotated in the direction to retard the spark. Immediately on the disengagement of crank, the commutator is advanced by the action of a spring. So long as the engine runs ignition is under control of the lever on the steering post. The price is $3.50.

Multiple die stock with adjustment device to allow wide range of work

From the Four Winds

IOWA COLLEGE TRAINS AMBULANCE DRIVERS—These men have had several years' experience as drivers of cars. They spent every afternoon for two weeks tearing down and building up and adjusting and driving cars used in ambulance service. They have enlisted and expect to leave for France with ambulance units soon

MICHIGAN Registers 184,126—Up to June 1 of this year 184,126 motor cars had been registered in Michigan. Last year the total number was 160,052.

Drives 393 Miles at 30.2 m.p.h.—S. H. Lewis, Binghamton, N. Y., drove a Franklin touring car to New York and return, 393 miles, in 12 hr. 48 min. The gasoline consumption was 19.65 m.p.g. The average speed on the down trip from Binghamton to New York was 32.3 m.p.h., and the gasoline average was 19.3 m.p.g. The return trip was by a different route, 200 miles, and the average speed was 28.4 m.p.h., the gasoline average 20 m.p.g.

Cole Climbs Mountain on High—In a recent demonstration of the Cole eight on Mount Washburn in the Yellowstone National Park, T. W. LaFleishe, a lawyer, drove to the top of Mount Washburn on high. Mr. LaFleishe was accompanied by six other passengers, three of whom weighed more than 200 lbs. Enough luggage for a ten-day outing was carried in addition. The 10,000 ft. were climbed without once resorting to the use of low gear.

To Observe Trail Marking Day—Trail Marking Day will be observed on the Black and Yellow trail some time this summer, the object being to remark the entire trail from east to west across South Dakota. Specified black and yellow paint will be used, and the remarking will be done by local representatives on the route. Plans for the establishment of registration places along the trail are being considered. Probably the first will be near the bridge across the Missouri at Pierre. A fairly accurate record of travel can be kept in this way.

Turnpike Rod of Many Tolls Is Sold—After several years of continuous effort by Dauphin, Lancaster and Berks counties, in central Pennsylvania, arrangements have been finally made for the purchase by the Pennsylvania department of highways of the 34 miles of road extending through those counties and controlled by the Dauphin and Berks Turnpike Co. The price paid is $75,000, half of which is to be paid by the department and the rest apportioned among the three counties according to the number of miles in each. Motorists passing through this section of Pennsylvania have been forced to use the turnpike, as a result of which they were subject to much annoyance. Fourteen toll houses are located along the road, which is heavily traveled at this time of year. The toll amounted to 3 cents a mile, or $1.06 for the entire length.

Goodyear Linguists Help Registrars—Many linguists of the Goodyear Tire & Rubber Co.'s Factory School at Akron, Ohio, rendered practical assistance to the registrars in charge of registration day machinery in that city June 5. As men of all nationalities were compelled to register, regardless of their allegiance to any foreign nation, many instances arose in which the registrars were unable to converse with applicants of alien birth. The Goodyear interpreters were helpful in obtaining the desired information from the applicants and transmitting it to the registrars.

$4,000,000 for New Minnesota Roads—With the idea of keeping highways in good condition as a war measure and providing additional roads Minnesota will spend $4,000,000 on construction and $570,000 for maintenance under state supervision. In the three large counties roads are to be built by county funds and in other states by bond issue returns.

Recruiting Car Tours Utah Roads—One of the familiar sights on Utah's highways now is a banner-bedecked Jeffery six car which goes through the rural districts and small towns in search of army recruits. Sergeant Ben Cherakin is in charge. It is the intention of the men sending the car out to send it throughout Utah and later into Southern Idaho.

Medical Officer for Ford Company—The War Department is now assigning medical officers to duty with the different motor companies as a result of the vast amount of work which is being done by motor organizations for the government, and Major Harold W. Jones of that corps has been detailed for duty with the Ford Motor Company, Detroit.

Detroit Aviation Unit to Require 6,000 Men—Plans are now being perfected to make Detroit one of the leading aviation centers for the United States army and it is expected that this city will be asked to provide 6,000 men for the air branch of the military. Arrangements are now under way for the recruiting of this unit. There will be rigid examinations attending. Applicants will be required to pass rigid tests, especially with regard to eyesight.

Bahr in Reo Wins Mystic Climb—Alfon E. Bahr driving a Reo four-passenger car without other passengers won the Black Bear Hill climbing contest staged by the Mystic Athletic Club of Chicago. Forty-five car owners participated. Mr. Bahr's car climbed the 45-deg. ascent of 500 ft. in 12 sec. Fred L. Behnert in a Chandler was second, 13 sec.; and B. F. Secord, in a Cadillac, was third, 14 sec. The run out to the hill attracted 276 tourists.

Motor Manikins Feature in Movie—Motor cars will be featured in the new patriotic film of Bryant Washburn, called "The Man Who Was Afraid." The hero, mama's boy, is spurned by his sweetheart and friends, but his spirit is aroused and when he awakens to war he appears with his sweetheart racing in cars for the fighting line. The far away effect is obtained by the use of the two Hartford Shock Absorber toy cars which were exhibited at the national motor shows in New York and Chicago. The manikins, Mr. Rough Rider and Miss Smooth Rider, the former in regulation army uniform and the latter as a nurse, represent the hero and his sweetheart.

Railroad Puts Ford on Tracks—The Chicago, Burlington & Quincy has adopted the Ford car for service by inspection officers, linemen, signal engineers, etc. Iron wheels with a flange have been substituted for the original wheels, enabling the car to operate over the tracks of the railroad at a speed ranging from 40 to 50 m. p. h. The gasoline motor speeders which have been in use for several years are not heavy enough to keep upon the rails, and many employees have been seriously injured when the small cars jump the track.

Coming Motor Events

CONTESTS
—1917—

July	14	Rochester, N. Y., hillclimb.
July	15	Missoula, Mont., track.
July	17-19	Intercity Reliability.
July	22	Anaconda, Mont., track.
July	29	Great Falls, Mont., track.
Aug.	5	Billings, Mont., track.
Aug.	17	Flemington, N. J., track.
*Sept.	3	Cincinnati, Ohio, speedway.
Sept.	3	Uniontown, Pa., speedway.
Sept.	3	Albuquerque, N. M., track.
Sept.	6	Red Bank, N. J., track.
Sept.	8	Pike's Peak, Colo., hill climb.
*Sept.	15	Providence, R. I. speedway.
Sept.	28	Trenton, N. J., track.
*Sept.	29	New York, speedway.
Oct.	6	Uniontown, Pa., speedway.
Oct.	6	Danbury, Conn., track.
*Oct.	13	Chicago, speedway.
Oct.	13	Richmond, Va., track.
Oct.	27	New York, speedway.

* A. A. A. Championship Award Event.

MEETINGS

July	10-11	National Automobile Dealers' Association.

SHOWS

Aug.	6-18	Fremont, Neb., tractor demonstration.
Sept.	9-15	Spokane, Wash., Interstate fair.
Sept.	2- 9	Milwaukee show, State Park fair, West Allis.
Oct	13-28	Dallas, Tex., state fair.

Among the Makers and Dealers

NEW Truck Company Is Formed—The Triangle Motor Truck Co. has been formed at St. Johns, Mich., with a capital of $50,000 and will manufacture motor trucks.

Minneapolis Company to Make Engines—The Minneapolis Steel & Machinery Co. is spending $325,000 for additional plants where it will manufacture engines for trucks and tractors.

To Add De Luxe Body Models—The Detroit Auto Products Co. announces that it will within a few weeks add two and possibly three closed models to the De Luxe line of bodies for Ford cars.

Toole With Wetmore-Quinn—G. E. Toole has been appointed in charge of the service organization of the Wetmore-Quinn Co. Mr. Toole formerly was production manager of the Champion Motors Co. of Fulton, Ill.

Lane Makes New Truck—The Lane Truck Co., Kalamazoo, Mich., is manufacturing a 3½-ton truck selling at $3,000. The company also will engage in the manufacture of a 1½-ton truck soon.

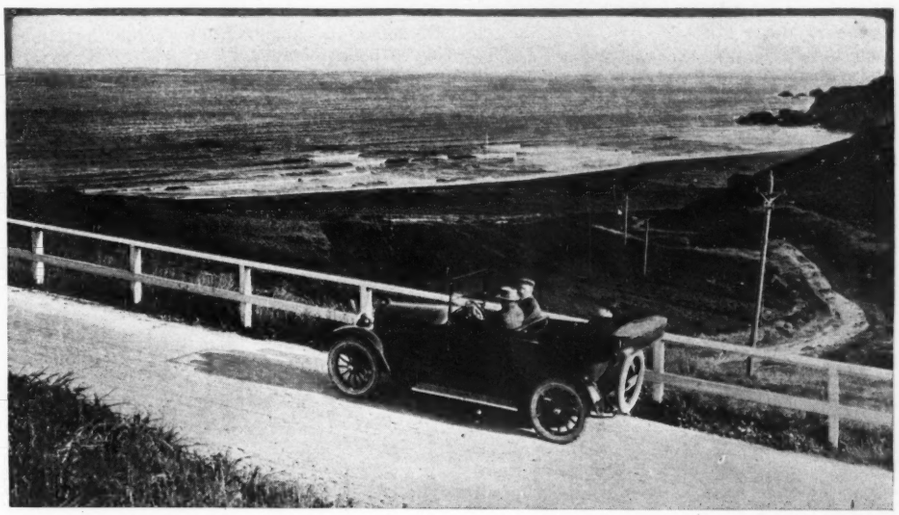
Duplex Starts Detroit Building—The Duplex Truck Co. has started excavating for its new factory building in Detroit and plans to have the building completed and ready for business by Jan. 1, 1918. It is expected that the building and the machinery to be installed will cost $200,000.

Chalmers Entertains Oplinger—The Chalmers Motor Co. recently entertained S. E. Oplinger of the Paddock-Zusi Motor Car Co., Newark, N. J., who won the grand prize in the sale of Chalmers cars throughout America in the seven-passenger and sedan type. Mr. Oplinger received a gold watch and a trip through the factory and was entertained at the Chalmers Round Table.

Tuthill Spring to Use Gas Furnaces—The Tuthill Spring Co., Chicago, has been conducting a series of experiments on a new type of gas furnace with a view to substituting it for the oil furnace now used, since fuel oil is so high. The concern now is operating fifty-two fuel oil furnaces in its forging and heat-treating departments. The demand for motor car and truck springs has so far exceeded the capacity of the plant that no more contracts for 1917 will be accepted.

Chandler Red Cross Dividend—The Chandler Motor Car Co. has declared an extra special Red Cross war dividend of 1 per cent, payable July 1 to stock of record June 26. The intention of the board is that this will not in any way interfere with the contemplated dividend Oct. 1 of 2 per cent and 1 per cent extra. A separate check is to be sent, with endorsement to the Red Cross, with the suggestion from the company that it be turned back to the company in order that it may be made in one lump sum from the company to the Red Cross.

Texas Dealers Get Together—One of the most unusual trade trips ever taken by motor car manufacturers and dealers was taken last week in Texas when 150 makers and sellers were the guests of Col. Frank P. Holland, Dallas, Tex., publisher of the Farm and Ranch. Colonel Holland chartered a special train over the Katy. It consisted of six Pullmans, a baggage car and diner. The trip to Galveston was made in the daytime and stops were made at all the larger towns enroute. At Galveston, Colonel Holland reserved two floors of the Hotel Galvez. This meeting of dealers and makers was held during the annual meeting of the Texas Press Association. The motor men, however, held a meeting all their own. It was merely a get-acquainted meeting and to discuss the gasoline car situation.



CLIMBING 3000 FT. ON HIGH—While E. J. Kilborn, general sales manager of the Liberty Motor Car Co. was on a recent trip to the coast a Liberty car climbed Mount Pedro, 3000 ft. above sea level. The five laps were made on high. This picture was taken on Rockaway Beach, 18 miles south of San Francisco

Chamberlain Manages United Motors Traffic—B. S. Chamberlain, formerly traffic agent of the Grand Rapids Board of Commerce, is now traffic manager for the United Motors Co., Grand Rapids.

Ecorse Co. to Make Castings—The Ecorse Foundry & Machine Co. has completed its large plant at Ecorse, Mich., and will start manufacture of gray iron casting at a capacity of 100 tons per day. Officers of the company are B. F. Everitt, president, W. A. C. Miller, vice-president, and A. J. Kimmean, treasurer and general manager.

Duplex Hauls Eight-Wheel Log Wagons—Eight-wheel log wagons are being used in the South as trailers for hauling turpentine dip, according to H. M. Lee, president of the Duplex Truck Co., Lansing, Mich. Duplex trucks not only haul capacity loads but pull these wagons loaded with 20 barrels of turpentine. Each barrel weighs about 600 pounds.

Prest-O-Lite Donates Land for Gardens—The Prest-O-Lite has had about 17 acres of its land plowed and prepared for planting, and the tract is being staked off in garden plots. An army of about 200 workers will use the ground. Prizes will be awarded for the best-cared-for plots, and the company may hold a miniature fair later on and give prizes for the best specimens of garden products. The Moorman Implement Co. furnished a Bull tractor and the services of an experienced man to plow the ground.

Selden Declares Dividend—The Selden Truck Sales Co. has declared a dividend of 5½ per cent on preferred in addition to the 5 per cent dividend declared several months ago. At the same meeting E. B. Osborn was elected treasurer to assume some of the duties held by George C. Gordon, who since the company's organization has been its president and treasurer. The Selden company built the largest number of motor trucks ever produced by it in one month during June. The sales increase for May was 261 per cent over that of May, 1916. Additions to the plant already made are overcrowded, and plans are contemplated for further extensions.

Schneider With Titan Motors—Clarence Schneider has been appointed superintendent of the Titan Motors Corp. Mr. Schneider formerly was production manager of the Parker Rust Proof Co.

Keeling Manages Haynes Advertising—H. R. Keeling has been appointed advertising manager of the Haynes Automobile Co. Mr. Keeling formerly was with the Armstrong Cork Co., Pittsburgh, Pa.

Gross Succeeds Morrow With Saxon—F. A. Gross has been appointed to succeed George S. Morrow as general manager of the Saxon Motor Car Co. of New York. Mr. Gross was formerly district manager for the Olds Motor Works at Lansing, Mich.

Browntree, Inc., to Distribute Hercules Plug—John T. Browntree, Inc., has been made representative of the Eclipse Mfg. Co., Indianapolis, Ind., on the Pacific Coast and in adjoining states and will distribute the line of Hercules spark plugs through the jobbing trade.

Aurora Dealers Show Used Cars—The recently organized Aurora, Ill., Automobile Trade Association put on a used car show at the Third Regiment Armory June 21, 22 and 23. Every member placed all his second-hand cars on sale. An orchestra furnished music and a small admission fee was charged to defray expenses. Each car offered for sale had been inspected previously by a committee and pronounced in good condition, thus protecting all purchasers.

Bukolt to Have Canadian Branch—The Bukolt Mfg. Co., Stevens Point, Wis., manufacturing Highway tire protectors, is preparing to establish a branch in Canada at Portage LaPrairie, Man. The sales office will be opened at once, and business men of Portage LaPrairie have undertaken to provide a suitable factory building which will make possible a production of 200 pairs of protectors daily and employment of seventy-

five men. A new plant has just been completed at Stevens Point. Early next year the company will build a three-story structure, 50 by 100 ft., in which the offices and a clubhouse for employees will be combined.

Bachman With J. C. Wilson Co.—L. A. Bachman has been appointed assistant purchasing agent of the J. C. Wilson Co. Mr. Bachman formerly was city buyer for the Chalmers Motor Co.

Gauvreau's Name Misquoted—In announcing the connection of Victor Gauvreau with the Pan Motor Car Co. as chief motor car designing engineer May 24 his name was incorrectly quoted as Victor Launeau.

Triangle Truck to Build—The Triangle Motor Truck Co., St. Johns, Mich., held a meeting of stockholders last week and arranged for the erection of a factory. The company has a capital stock of $50,000, of which $32,500 was subscribed in one night.

Van Dusen Leaves Detroiter—Walter H. Van Dusen, director of sales and advertising for the Detroiter Motor Car Co., has resigned his position. Mr. Van Dusen was with the King Motor Car Co. in the metropolitan district before joining the Detroiter.

Lansing Makers Employ Women—A scarcity of common labor has forced the Lansing, Mich., companies to employ women as workers. Companies now employing them in large numbers are the Reo Motor Car Co., the Olds Motor Works, the Gier Pressed Steel Co., the Dail Steel Products Co. and the Lansing Stamping Tool Co.

Michigan Screw Increases Equipment—The Michigan Screw Co., which added 35,000 square feet of space to its production department last year, will be equipped this season to handle its business with greater ease than a year ago. The company, which is now employing more than 300 men, has had to resort to considerable night work during the last twelve months.

Uptegraff Joins Packard Engineering Staff—R. E. Uptegraff has joined the Packard Electric Co., Warren, Ohio, as designing engineer. Mr. Uptegraff was assistant chief designing engineer for the Pittsburgh Transformer Co. for more than five years and resigned to accept half interest in the B. Rutherford Co., consulting engineers, Pittsburgh, Pa., which work will be carried on in addition to his work with the Packard.

Chevrolet Motor Entertains—The Chevrolet Motor Co. of Michigan gave a dinner to its executives and foremen of the Flint, Mich., plant. F. W. Hohensee, general factory manager, was the principal speaker at the get-together meeting. Other talks were made by General Sales Manager W. C. Sills, Vice-President A. B. C. Hardy, A. C. Mason and others. There were 150 present. W. C. Bills, A. B. C. Hardy, F. W. Hohensee, J. H. Newmark and M. B. Leahy, sales manager of the Chevrolet Motor Co. of New York, were from the New York office.

Angsten-Koch Increases Capacity—The Angsten-Koch Co., Chicago, has moved into its new factory and will be able practically to double its capacity. Twelve new machines have been installed.

Schachinger to Porter Mfg. Co.—Donald Schachinger has been appointed manager of the body building department of the Porter Mfg. Co., Ann Arbor, Mich. Mr. Schachinger was formerly with the Griswold Body Co.

Hood Service Makes Appointments—The Wallace C. Hood Service Bureau has appointed W. L. Smith supervisor of the New England territory; L. H. Oatman, northwestern Pennsylvania and northeastern Ohio; E. E. Sheldon, the entire eastern territory outside of New England; and Edward A. Scheu, the central west and western states.

Miller to Manage Michigan Plant—C. W. Miller has been appointed general manager of the Michigan plant of the Stell Products Co., Cleveland, Ohio. Mr. Miller for several years has had charge of production and sales work in the Cleveland plants and will now have charge of sales in the state of Michigan. The Michigan plant specializes on drag links, rod assemblies and other parts, as well as electric welding.

Barnes with Eagle Macomber—Frank E. Barnes has resigned his position as factory superintendent for the King Motor Car Co., Detroit, to become production manager of the Eagle Macomber Motor Car Co., Sandusky, Ohio. Mr. Barnes has been in the motor industry several years, first with the Knox Motor Car Co. and then with Stevens-Duryea, Buick, Elmore and Hupp. Production of the new car is expected to begin July 1.

Firestone Takes Movie to Meeting—The close relationship of advertising and selling was brought home to the recent convention of the Association of National Advertisers at Detroit by a motion picture film, "The Link," produced by the Firestone Tire & Rubber Co., to teach its sales force the immense value of advertising. Edward S. Babcox, advertising manager of Firestone, was elected vice-president of the association.

Olds Makes Appointments—D. B. McCoy has been appointed advertising manager of the Olds Motor Works. Mr. McCoy was with the Oakland Motor Car Co. for several years. A. L. A. Spetler, who has been manager of the Michigan branch of the Michigan Oldsmobile Co., wholesale distributor for several states, has been made division sales manager of the Olds Motor Works. Mr. Spetler's territory includes the central states and extends from Ohio to Colorado and from the lakes to the gulf. His headquarters will be at Lansing, Mich.

To Sell Niles in Twenty Counties—The Dalzell Motor Car Co., Youngstown, Ohio, has contracted to take on the sale of Niles trucks in twenty counties in Ohio and Pennsylvania, including Allegheny.

McKee Leaves Maxwell for Stearns—E. A. McKee has resigned from the Maxwell Motor Co., Inc., and joined the F. B. Stearns-Knight Co. of Cleveland, Ohio. Mr. McKee will handle Michigan and Indiana territory.

Higrade Begins Production—The Higrade Motors Co. will complete the first of its series of fifty trucks for delivery by Aug. 1. Contracts for its 800 trucks to be delivered in monthly series during the next year already are on hand.

Truck Attachment Co. Starts Production—The Truck Attachment Co. has started in business in Cleveland, Ohio, making truck attachments and auxiliary transmissions. The company has located in the former Carey Looping Co. plant.

Motor Insurance Company Elects—The Badger State Mutual Limited Automobile Insurance Co., Rhinelander, Wis., has completed its organization by the election of these officers: President, Charles H. Marshall, North Crandon, Wis.; vice-president, Victor H. Schneider, Iron Mountain, Mich.; secretary and manager, Peter P. Dandoneau, Rhinelander; treasurer, Grant V. Clark, Rhinelander.

Gibson Co. Makes Changes—The Gibson Co., Overland and Willys-Knight distributor at Lafayette. Ind., and Vincennes, Ind., has appointed W. J. Reed as manager at Lafayette to succeed L. Z. McKee. Howard Brewer, formerly assistant manager of the branch at Terre Haute, Ind., succeeds Sol Allman, who has resigned to engage in private motor car business, at Memphis, Tenn. The business of the George G. Goll Co., dealer at Champaign, Ill., has been purchased by the Overland Sales Co.

Racine-Sattley Plant Is Sold—The plant of the Racine-Sattley Co. at Racine, Wis., which is occupied under lease by twenty-five separate industries, many of them making motor car parts and accessories, has been purchased by Logan Hay of Springfield, Ill., for $300,000. It is said that present leases will not be disturbed for the present. The largest tenant is the Wallis Tractor Co. When the Racine-Sattley interests consolidated their carriage and vehicle production at Springfield, Ill., the Racine plant was thrown open to leases in parcels.

Brooklyn, N. Y.—Palmer Garage; capital stock, $5,000; to deal in motor cars; incorporators, Henry W. Palmer, Frank U. Walford and Edna F. Walford.

Caro, Mich.—Miller Auto Top; capital stock, $20,000; to manunfacture motor car tops for Ford cars; incorporators, T. W. Atwood, B. H. Smith and Peter A. Miller.

Cincinnati, Ohio—Barlow-Hodson Motor Car Co.; capital stock, $50,000; to sell motor cars; incorporators, Ray K. Barlow, J. D. Hodson, J. A. Duchemin, Mamie Michael and C. E. Barlow.

Cleveland, Ohio—Cleveland A-B-C Starter Co.; capital stock, $10,000; to manufacture starters; incorporators, Ray W. Cudmore, Clayton Edwards, Hubert L. Edwards, C. L. Laxear and A. J. Schustrich.

Cleveland, Ohio—Phenix Truck Sales Co.; capital stock, $35,000; to deal in trucks; incorporators, Charles Mayer, Stanley Haveleo, William H. Balhorn, James Holan, John J. Metzger and Max Delfe.

Cleveland, Ohio—Malthic Auto Shop Co.; capital stock, $10,000; to operate a garage; incorporators, J. R. Malthic, C. S. Malthic, H. A. Spring, E. G. Simecek and R. T. Kelsey.

Cleveland, Ohio—Ben-Hur Motor Car Co.; capital stock, $25,000; to sell motor cars; incorporators, John B. Spyskmn, Edgar R. Bayes, E. M. Kossin, M. B. Punnell and Augustus W. Bell.

Detroit—Armored Motor; capital stock, $100,000; incorporators, W. A. Ross, A. L. Mancourt and W. C. Artz.

Detroit—Modern Garage; capital stock, $35,000; incorporators, Otto A. Misch, F. O. Wolf and D. L. Richardson.

Dover, Del.—Motor Accessories; capital stock, $2,000,000; general sales agency; incorporators, Henry F. Vortkamp, Howard R. Sanford and Robert W. Thompson.

Dover, Del.—Metropolis Motor; capital stock, $500,000; to manufacture internal combustion engines and machinery; incorporators, J. W. F. Smith, O. H. Kennedy and G. C. Henne.

Ft. Worth, Tex.—Fort Worth Auto Bus Co.; capital stock, $20,000; incorporators, George W. Clifford, W. C. Forbes and K. W. Berry.

Quincy, Ill.—Niswader Mfg. Co.; capital stock, $7,000; to manufacture and deal in demountable rims for motor cars; incorporators, John L. Niswader, Harry L. Bert and Fred Scholz.

New York—Seal-Franklin Auto; capital stock, $20,000; to make engine appliances; incorporators, H. F. Franklin, R. S. Seal anl T. H. Clark.

New Richmond, Ohio—New Richmond Garage Co.; capital stock, $6,000; to operate a garage; incorporators, Joseph H. Clasgens, Niel A. Buckley, H. Buckley, A. D. Roettinger and A. S. Clasgens.

St. Louis, Mo.—Brandle Motors Co.; capital stock, $50,000; incorporators, F. O. Brandle, C. P. Brandle, Guy Wilson and E. K. Trush.

St. Louis, Mo.—R. C. Solomon Motor Co.; capital stock, $10,000; incorporators, R. C. Solomon, Christ Hasenpflug and M. E. Solomon.

Tontogany, Ohio—Gleaner Co.; capital stock, $5,000; to sell motor cars; incorporators, William Tyler, John H. Schaller, Fred C. Main, Oliver B. Browne and Gust Wenig.

Youngstown, Ohio—Lincoln Park Motor Bus Co.; capital stock, $10,000; to operate a motor bus; incorporators, William Thompson, James A. Frame, Earl W. Froome, C. Frank Domhoff and S. M. Thompson.

Youngstown, Ohio—F. P. Whiteside Co.; capital stock, $10,000; to sell motor cars; incorporators, F. P. Whiteside, A. H. Sayler, W. L. Holdridge, E. O. Whiteside and W. R. Vaughn.

Youngstown, Ohio—Dalzell Motor Car Co.; capital stock, $100,000; to sell motor cars; incorporators, T. Paul Dalzell, H. C. Fox, Samuel Stiles, A. E. McCoy and H. C. Hoffman.